

Plant Breeding Abstracts

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Plant Breeding Abstracts

Vol. XXIV, No. 1

C. A. B.

15 JAN 1954

FILE

*STATISTICS

- 1 HALDANE, J. B. S.
On some statistical formulae.
Sci. & Cult. 1953 : 18 : p. 598.

Approximate formulae, requiring only tables of decimal logarithms for their utilization, are given for (1) the probability that an observation should differ from the mean by more than x standard deviations, (2) the probability that χ^2 should exceed a given value, and (3) the probability that z^2 should exceed a given value. The formulae consist of the leading terms of asymptotic expansions.

- 2 MEMORIA, J. M. P.
Comparação de grupos "versus" comparações emparelhadas. (**Group comparisons versus paired comparisons**).
Ceres, Minas Gerais 1952 : 9 : 105-16.

Calculations are presented which show that better results are obtained from paired comparisons, particularly when the data of the two groups are correlated.

- 3 ATANASIU, N.
Über die statistischen Auswertungsmethoden der Feldversuche. (**The methods of statistical calculation of the results of field experiments**).
Z. PflErnähr. Düng. 1953 : 61 : 229-35.

The advantages of systematic as opposed to random designs in eliminating errors due to soil inconsistency are explained.

- 4 KUIPER, N. H.
On 4³ factorial designs with confounding.

Netherlands J. Agric. Sci. 1953 : 1 : 11-14.
"A design is given for three factors each at four levels in three blocks of 8 x 8 plots.

In each block in the field, fertility in the direction of columns and of rows is not neglected. The main effects are not confounded. The interactions are partially confounded. The part is $\leq 1/3$ for any component of the interaction. Formulae for the estimation of main effects and (all) interactions and for the analysis of variance are given in vector notation."

[Author's Summary].

- 5 HODNETT, G. E.
A uniformity trial on groundnuts.
J. Agric. Sci. 1953 : 43 : 323-28.

A uniformity trial of Natal Common groundnuts at Kongwa, Tanganyika, is described. Long narrow plots proved more efficient for yield determinations than short wide plots; plots should be arranged with their long axes perpendicular to the contours. Confounded and incomplete block designs are more efficient than randomized blocks, provided that the lay-outs are arranged to best advantage.

- 6 WASSOM, C. E. & KALTON, R. R.
Estimations of optimum plot size using data from brome grass uniformity trials.
Res. Bull. Ia. Agric. Exp. Sta. 1953 : No. 396 : 296-320.

Uniformity data from three fields of Fischer brome were used to calculate the best field designs for comparative trials. The optimum plot size was estimated as 3.5 x 7.5 feet. With regard to shape, plots long in the direction of the fertility gradient gave the smallest estimates of variance. Simple and triple lattice designs gave increased precision, but the extra expense may not justify their use in broadcast planting, and should the lay-out be perpetuated for several years and missing plots become numerous, then randomized complete blocks would probably be preferable.

*GENETICS

- 7 **Quantitative inheritance.**
HM Stationery Office 1952 : Pp. 151.
Wright, S. *The genetics of quantitative variability.* (pp. 5-41).

The major problems of quantitative genetics are outlined. After discussing the tests appropriate for choice of a suitable scale for quantitative characters, the author considers the partitioning of variation into its genetic and nongenetic components, calculation of the number of determining factors, the effects of dominance and linkage, the possible importance of minor mutations, balanced factors, pleiotropy and interaction systems, and overdominance.

Waddington, C. H. *Canalization of the development of quantitative characters.* (pp. 43-47).

Development is a process involving canalization, i.e. a tendency to achieve a particular end condition irrespective of a certain variability both in the initial situation and in the environment. Strong canalization is characteristic of wild types in contrast to mutants, which are often more sensitive to agents stimulating variation. In strongly canalized types, explanations of quantitative inheritance based on additive gene action are inadequate. It also follows that it may prove useful in breeding to introduce a few mutant genes for the purpose of weakening canalization.

Mather, K. & Vines, A. *The inheritance of height and flowering time in a cross of Nicotiana rustica.* (pp. 49-79).

The mode of inheritance of the quantitative characters height and flowering time in *Nicotiana rustica* was studied by raising F_1 , F_2 , F_3 and F_4 families, sib-cross families and first and second generation back-cross families of a selected cross. Scale transformations were not made, though the direct readings were not fully adequate. Variation was partitioned into components for genetic effect, heterozygosity and environment (cf. *PBA, Vol. XIX, p. 913), and it was found that height, but not flowering time, showed differences in the size of the components of variation between blocks within years, also genic and genic-environmental interactions that themselves varied between years.

In an appendix, the author outlines a revised system of notation for the different variances and covariances used in his analysis.

Woolf, B. *Environmental effects in quantitative inheritance.* (pp. 81-102).

A general criticism is made of the type of analysis found in Mather's study of the relative importance of heredity and environment in the determination of ear conformation in barley (cf. PBA, Vol. XIX, p. 913). It is considered that reliance on second-order statistics to detect or measure nonadditive gene interactions or even additive environmental effects is unjustified, and that the procedure exemplified by Mather is strongly biased in favour of genetic as against environmental factors responsible for variation.

Mather, K. *Comment on Dr. B. Woolf's paper.* (pp. 103-11).

In this reply to B. Woolf's criticisms of the application of analysis of variance to partitioning

variation into its genetic and environmental components (cf. PBA, Vol. XIX, p. 913), the author deprecates Woolf's assertion that environmental effects should be given an automatic priority, and goes on to show that Woolf's criticisms lose much of their force when scaling is taken into account.

Reeve, E. C. R. *Genetical analysis of a strain of Drosophila melanogaster selected for long wings.* (pp. 113-22).

A strain of *D. melanogaster* was selected for over 70 generations for body size, using a mating system involving mild inbreeding. After the 46th generation, no further increase in body size occurred, but genetic variance remained high. When selection for body size is based on wing lengths, thorax length shows a proportional increase, but when selection is relaxed, wing length declines far more rapidly than thorax length. Possible explanations for these findings based on overdominance and lethal effects are considered.

Robertson, F. W. *Interactions between chromosomes from large and small strains of Drosophila melanogaster.* (pp. 123-34).

Using an extension of the chromosome assay technique devised by Mather and Harrison (cf. PBA, Vol. XX, Abst. 78), an analysis was made of the effect of the major chromosomes of *D. melanogaster* on body size. The results showed that simple additive interaction was inadequate to explain the inheritance of body size and that the deviation from additivity could not be attributed to metric bias or simple dominance effects. It appears, therefore, that interaction between loci on different chromosomes must be postulated.

Cavalli, L. L. *An analysis of linkage in quantitative inheritance.* (pp. 135-44).

The existence of linkage between the polygenes determining number of abdominal bristles in *Drosophila melanogaster* has been demonstrated by analysing the differences between back crosses involving (1) males or (2) females as the back-cross parents. Further analysis has provided estimates of the number of chromosomes with polygenic activity and of the number of polygenes.

Falconer, D. S. & Latyszewski, M. *Selection for size in mice on high and low planes of nutrition.* (pp. 145-51).

Selection for weight under good conditions gave a more rapid improvement than under inferior

conditions, but, on transferring such a line to inferior conditions, it proved less satisfactory than lines selected under such conditions. Strains selected for weight in an inferior environment, when transferred to good conditions, did much better than the unselected controls and were only slightly inferior to lines selected under good conditions.

8 LEONE, C. A.

Genetics : Lysenko versus Mendel.

Trans. Kans. Acad. Sci. 1952 : 55 : 369-80.

The controversy between Soviet and Western genetics is reviewed, and the views on heredity of the Mendel-Weismann-Morgan school are compared with the Lysenko-Mičurin train of thought. Soviet claims on vernalization, rapid transformation of species and vegetative hybridization are criticised, possible reasons for their acceptance in Russia are put forward, and the problem of Mičurin's so-called mentors is broached.

9 RÜMKE, C. L.

Genetische landschappen. (Genetic landscapes).

Utrecht : 1953 : Pp. 16.

In this inaugural address of the Professor of Genetics at Utrecht University, a historical survey is given of the development of genetics. Genetical terms are explained and the meaning of different technical expressions given.

10 SAUER, J. D.

Herbarium specimens as records of genetic research.

Amer. Nat. 1953 : 87 : 155-56.

Referring to M. J. Murray's procedure of preserving herbarium specimens of the material he employed for his study of sex determination in *Amaranthus*, the author advocates among geneticists a much more extensive use of the practice of making herbarium and other records, not only with a view to taxonomic verification but also the provision of material for future investigations.

11 MICHIE, D. & WALLACE, M. E.

Affinity : a new genetic phenomenon in the house mouse.

Nature, Lond. 1953 : 171 : 26-28.

Anomalous segregation ratios obtained from both subspecific and intraspecific matings are explained on the basis of the hypothesis that affinity, or an effective attraction between centromeres of chromosomes derived from the same parent, is capable of producing quasi-linkages.

12 CATCHESIDE, D. G., MICHIE, D. & WALLACE, M. E.

'Affinity' in maize.

Nature, Lond. 1953 : 172 : 112-13.

Citing data reported by Longley (cf. *PBA*, Vol. XV, Abst. 1000), D. G. Catcheside draws attention to the fact that deviation from random segregation in maize depends upon heterozygosity for heterochromatic knobs of the chromosomes, the preferential or polarized segregation of which is activated or enhanced by the presence of an abnormal type of chromosome 10. This deviation is considered to be analogous to the phenomenon of affinity described by Michie and Wallace for the mouse (cf. Abst. 11). D. Michie stresses the view that affinity is a new concept. M. E. Wallace also argues that the nonrandom segregation in maize and the mouse should have separate terms, since in maize the anomaly is confined to megasporogenesis, and depends upon a particular chromosome; it is moreover thought to be controlled directly not by the centromeres, as in the mouse, but by the neocentromeres (cf. *PBA*, Vol. XXIII, p. 668).

13 FYFE, V. C.

Double reduction at the mid locus in *Lythrum salicaria*.

Heredity 1953 : 7 : 285-92.

Estimates have been made for α at the mid locus affecting style length in the tetrasomic species *L. salicaria*, α being the frequency of double reduction, i.e. the frequency with which a gamete receives two alleles derived from the same chromosome at meiosis (cf. *PBA*, Vol. XV, Abst. 433). Combining the data from ovules and pollen, α was found to be $9.878 \pm .936\%$.

14 JOHNSON, B. L.

Evidence for irregularity in crossing over of the S locus in the eversporting type of *Matthiola incana* (L.) R. Br.

Genetics 1953 : 38 : 229-43.

Eversporting single-flowered stocks are usually heterozygotes of the constitution $Sl/s+$, l being a factor for lethal pollen, incompletely linked with S , and s being a recessive for the double-flowered form, which is sterile. Upon selfing they produce singles ($Sl/s+$) and doubles ($s+/s+$) in a 1 : 1 ratio in successive generations. An exceptional true-breeding single-flowered plant ($Sl/Ss+$) was obtained from an eversporting line. It is postulated that irregularity in crossing over between the Sl and $s+$ chromosomes, presumably due to lack of structural homology, resulted in the reduplication of the locus S on the $s+$ chromosome. Subsequent

transfer of the S fragment from the $s+$ chromosome could account for exceptional doubles produced by otherwise true-breeding single plants carrying l .

15 SPIEGELMAN, S.

Mapping functions in tetrad and recombinant analysis.

Science 1952 : 116 : 510-12.

The expression $p_{AB} = \frac{1}{2}[1 - (1 - 3/2P_{AB})^{2/3}]$ is derived to connect the recombinant frequency p_{AB} between loci A and B with frequency P_{AB} of M II segregations of A and B to yield tetra-type asci.

16 OWEN, A. R. G.

Four-strand crossing-over.

Nature, Lond. 1952 : 170 : 985-86.

A reply is made to criticisms in a paper by Carter and Robertson (cf. *PBA*, Vol. XXIII, Abst. 12) of the author's treatment of the probability distribution of exchange points along single strands of bivalents. It is shown that this treatment is not restricted to 2-strand recombination, and that the criticisms of Carter and Robertson derive from their failure to distinguish between formulae appropriate for exchange points and chiasmata, respectively.

17 CARTER, T. C. & ROBERTSON, A.

Four-strand crossing-over.

Nature, Lond. 1952 : 170 : p. 986.

In reply to Owen's criticisms of their earlier paper (cf. Abst. 16), the authors state that, in their opinion, Owen's model is unsatisfactory insofar as it rules out the possibility of explicit treatment of chromatid interference.

18 OWEN, A. R. G.

The analysis of multiple linkage data.

Heredity 1953 : 7 : 247-64.

"An elementary method is developed by which the frequencies of simultaneous recombination of several closely linked loci can be specified, and formulae are given for as many as 6 such loci."

[Author's summary].

19 BENNETT, J. H.

Linkage in hexasomic inheritance.

Heredity 1953 : 7 : 265-83.

"Gametic matrices are given for twelve isomorphic sets of hexasomic genotypes with two alleles at each of two linked loci. It is found that from a classification at two linked loci of the gametic output from digenic hexasomic organisms, we can estimate only twenty-four independent linear combinations of the frequencies of the forty modes of gamete formation. The deficiency of information is therefore much

greater than with two tetrasomic loci where, from doubly digenic genotypes, we can estimate ten independent linear combinations of the frequencies of the eleven modes of gamete formation."

[Author's summary].

20 KIMURA, M.

(The statistical theory appropriate for problems concerning prereduction and postreduction of chromosomes).

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 175-84. [Japanese].

Formulae are derived for the distribution of prereductional and postreductional chromosome segments in the tetrads of lower plants. For telomitic chromosomes of genetic length $100 l$, the frequency distribution of the length ξ of postreductional segments, assuming that multiple cross-overs are negligible, is given by $\Phi(\xi) = \Phi'(\xi) + 2\Phi'(l - \xi) - (l - \xi)\Phi'(\xi) - 1$, where $\Phi(\xi)$ is the recombination probability between two genes 100 units apart.

If $f(x)$ represents the probability of postreduction at a point x , then the mean length of the postreductional components of a chromosome segment ab is $L = \int_a^b f(x) dx$.

21 ANDERSON, E.

Introgressive hybridization.

Biol. Rev. 1953 : 28 : 280-307.

The concept of introgressive hybridization is outlined, with particular reference to the flora of the eastern United States where allopatric introgression is at a minimum. An hypothesis that individuals with characteristics intermediate between two well-defined species or varieties represent an undifferentiated "genetic pool" out of which both entities have emerged is discussed; all current observations, however, support the alternative theory of introgression. No evidence was obtained to prove that mutation was the immediate source of variability for natural selection among populations in this area. Since introgression and mutation are not mutually exclusive, it is possible that mutation is ultimately responsible for the differentiation of the germplasm whereas introgression is the immediate cause of population variability. In this respect the difficulty of distinguishing between mutation and introgression is considered. Crossing over in short heterozygous introgressive segments may be readily confused with gene mutation, particularly in many organisms resulting from extensive introgression. Since such organisms have often been used for genetic research, it is probable that much of the

supposed mutation may well have been crossing over in introgressive segments.

22 KIMURA, M.

(On the recombination of chromosome segments and the degree of homozygosis accompanying selfing).

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 53-62. [Japanese].

Formulae are derived and graphical and numerical values given for the frequency of parental and recombinant homozygous chromosome pairs after n generations of selfing involving m chromosome pairs. The distribution of the frequencies of the recombinant homozygotes according to the relative proportions of the two parental components is also derived.

23 RENDEL, J. M.

Heterosis.

Amer. Nat. 1953 : 87 : 129-38.

The dominance, harmful mutation, euheterosis, overdominance and physiological balance theories of heterosis are compared. According to the hypothesis of physiological balance, a version of the overdominance concept, heterosis is due to interaction between gene products which are essential growth substances. The theory is expanded on the basis of information on the biochemical genetics of *Neurospora* and some higher plants (cf. *PBA*, Vol. XXIII, p. 668). It is shown that when more than two gene pairs are involved, in spite of its greater fitness, the multiple heterozygote forming the optimum type tends to be eliminated from a random breeding population through fixation of other types; this situation results in pure-breeding populations, which, when suitably crossed, exhibit heterosis.

24 HAGBERG, A.

Further studies on and discussion of the heterosis phenomenon.

Hereditas, Lund 1953 : 39 : 349-80.

The author summarizes the results of the previous investigations on *Galeopsis*, barley, rye and red clover (cf. *PBA*, Vol. XVIII, Abst. 1376; Vol. XXII, Abst. 2387; Vol. XXIII, Absts. 276 and 1952; and Vol. XXIV, Abst. 321), giving a general discussion of the following: (1) types of heterosis and methods of evaluation; (2) the occurrence of heterosis in relation to different modes of reproduction, wild and cultivated species, diploidy and polyploidy, and structural heterozygosity; (3) manifestation of heterosis; and (4) dominance and overdominance. It is maintained that dominance and overdominance may exist simultaneously, both contributing to heterosis.

25 GARTNER, J. B., HANEY, W. J. & HAMNER, C. L.

The effect of indoleacetic acid and amount of solar radiation on heterosis in the snapdragon (*Antirrhinum majus* L.).

Science 1953 : 117 : 593-95.

Heterosis, as indicated by the differences between the F_1 value and the mean of the two *Antirrhinum* parents with respect to height and dry weight per plant, increased with the seasonal increase in solar radiation. The F_1 hybrids exhibited a greater response to spraying with indoleacetic acid than either parent. The inhibitory effects of indoleacetic acid on cucumber roots were reduced much less by the tissue extract from the F_1 than by extracts from the parents, suggesting that the F_1 hybrids had a less effective mechanism for the inactivation of indoleacetic acid.

26 HAYMAN, B. I. & MATHER, K.

The progress of inbreeding when homozygotes are at a disadvantage.

Heredity 1953 : 7 : 165-83.

The progress of inbreeding in large populations is considered in relation to the effect of selection against disadvantageous homozygotes. With disadvantages above a critical value, which varies according to the system of inbreeding, complete homozygosis is never obtained, the population continuing to carry heterozygotes at equilibrium. The progress of six different systems of mating equilibria is analysed in two cases, one in which any number of alleles are present, all the homozygotes possessing the same relative disadvantage, and another confined to two alleles, a and b , the homozygotes aa and bb having unequal disadvantages. Two other schemes of selection are also examined: one in which the same number of offspring is selected at random from each mating in a generation to provide matings for the next generation, and another in which it is assumed that all homozygotes having some heterozygous sibs show a survival rate differing from that of homozygotes whose sibs are all homozygotes. The practical implication of the results of the analysis are discussed.

27 HAYMAN, B. I.

Mixed selfing and random mating when homozygotes are at a disadvantage.

Heredity 1953 : 7 : 185-92.

"The equilibrium is investigated of a large population breeding under a system of mixed selfing and random mating with selection against

the homozygotes. Diagrams are produced giving the types of equilibrium and illustrating the approach to equilibrium in particular cases."

[Author's summary].

- 28 LEWIS, D. & CROWE, L. K.
Theory of reversible mutations.
Nature, Lond. 1953 : 172 : p. 501.

Previous investigations on the gene complex *S* for incompatibility in *Oenothera organensis* revealed two types of mutation: (1) permanent inactivation or loss, and (2) reversible changes, including delayed alterations (cf. *PBA*, Vol. XXII, Abst. 900). Research on *S* in *Prunus avium* has provided further evidence that such reversible changes are genuine gene mutations. As in *Oenothera*, the gene complex *S* consists of at least two mutationally independent parts, one of which controls reactions in the pollen and the other those in the style. Reversible mutation occurred in material irradiated during a period which included the prophase stage, whereas all the permanent mutations were induced by treatments given in the resting stage, and not including any prophase nuclei. La Cour and Rutishauser have reported that subchromatid breaks, probably the cytological basis of reversible mutations, occurred during prophase, and not resting stage or metaphase (cf. Abst. 72). The complementary nature of the cytological and genetical evidence not only confirms the relationship between chromosome breakage and gene mutation, but gives support to the theory that reversible mutation is due to loss of a proportion of the polypeptide chains of a gene, followed by recovery of the unaffected remainder.

- 29 CAMPBELL, P. N. & WORK, T. S.
Biosynthesis of proteins.
Nature, Lond. 1953 : 171 : 997-1001.

A review of recent experimental work throwing light on the mechanism of protein synthesis is presented. It is pointed out that the synthesis of species-specific protein in the cytoplasm and in enucleate cells, the general process of ontogenetic differentiation, and the formation of adaptive enzymes all present serious difficulties for the theory of protein synthesis by nuclear gene templates.

- 30 DOUNCE, A. L.
Nucleic acid template hypotheses.
Nature, Lond. 1953 : 172 : p. 541.

Replying to criticisms by Campbell and Work of the above hypothesis of protein synthesis (cf. Abst. 29), the author points out that protein

synthesis in the cytoplasm may come about by ribonucleic acid templates themselves synthesized from nuclear deoxyribonucleic acid templates or by self-duplicating plasmagene templates.

- 31 WORK, T. S. & CAMPBELL, P. N.
Nucleic acid template hypotheses.
Nature, Lond. 1953 : 172 : 541-42.

While agreeing with Dounce that it is not necessary to assume that genes act as direct templates (cf. Abst. 30), the authors point out that the difficulty still remains that template hypotheses imply a one-one relationship between genes and proteins.

VARIATIONS, MODIFICATIONS, MUTATIONS

- 32 OWEN, A. R. G.
A genetical system admitting of two stable equilibria.
Nature, Lond. 1952 : 170 : 1127-28.

It is shown that a sexually dimorphic population in which the genotypes *AA*, *Aa* and *aa* have different viabilities within and between the sexes may exist in three possible equilibria, two stable and one unstable. It seems that one condition for the existence of three equilibria is that, in one sex at least, one homozygote must be at an advantage relative to the heterozygote, while another condition is that the difference in viability between the homozygotes and heterozygote should be in opposite senses in the two sexes.

- 33 SLOBODKIN, L. B.
An algebra of population growth.
Ecology 1953 : 34 : 513-19.

An algebra is devised for representing population growth, taking into account individual variation in age and size, which is ignored in the Verhulst-Pearl equation for population growth. Using the new algebra, a model population is defined which has the oscillatory properties known to characterize various biological populations. The evolutionary importance of oscillation in population size and its relationship with migration are discussed.

- 34 WALLACE, B., KING, J. C., MADDEN, C. V., KAUFMANN, B. & MCGUNNIGLE, E. C.
An analysis of variability arising through recombination.
Genetics 1953 : 38 : 272-307.

Two hypotheses concerning the genetic structure of a population are discussed. One theory

EVOLUTION

postulates a genetically homogeneous system, in which the loci are represented by single wild-type alleles and by a few mutant alleles with negative selective value. The second hypothesis postulates that selection favours particular heterozygotes, thus establishing at each locus a series of multiple alleles, selected according to the alleles at all other loci. The results of experiments carried out on *Drosophila* to test the two theories give support to the second. It is suggested that the concept of a "phenotypic" gene derived from the analysis of homogeneous experimental material may not be appropriate for the elucidation of the genetic structure of populations, particularly in view of the numerous cases of gene interaction known to occur.

- 35 RENNER, O.
Über *Oenothera hybrida* mut. *helix*. (On *Oe. hybrida* mut. *helix*).
Planta, Berlin 1953 : 42 : 30-41.

The recessive mutant *helix*, characterized by leaf aberrations and growth defects, is described and the results of crosses with other species of the genus *Oenothera* are given.

The stunted vegetative growth of *Oe. hybrida* mut. *helix* is attributed to growth substance disorders.

Strikingly similar leaf aberrations, probably partly attributable to the same cause, are found in the 15-chromosome mutant *dependens* (cf. *PNA*, Vol. XX, Abst. 1338).

- 36 GUSTAFSSON, Å.
Nya vägar inom växtförädlingen. (New methods in plant breeding).
Svensk JordbrForsk. 1953 : 39-44.

An explanation is given of the following techniques: the induction of polyploidy and of changes in particular genes or parts of chromosomes; and the use of ionizing irradiation, as exemplified by research at Svalöf and Kjeller's experiments in Norway on the treatment of seeds with slow neutrons.

- 37 D'AMATO, F.
The problem of the origin of spontaneous mutations.
Caryologia, Pisa 1953 : 5 : 1-13.

The mutagenic action of phenols, alkaloids, adenine and other purine derivatives, mustard oil, coumarin, desoxycholic acid, necrosin, putrescin, and water extracts from aged seeds and from onion bulbs is surveyed, with reference to the possible origin of spontaneous hereditary changes.

- 38 ILJIN, M. M.
(The phylogeny of flowering plants from the viewpoint of Mičurinite biology).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 : 97-118. [Russian].

The strobilar theory of the origin of the angiosperms is rejected for its "idealist" content. It is suggested that it should be superseded by a new polyphyletic theory.

- 39 ISAEV, S. I., MERKURJEVA, E. K., STROGANOVA, N. S. & FEĖGINSON, N. I.
(Criticism of new ideas in science from an outdated viewpoint).
Izvestija Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1953 : No. 2 : 34-48. [Russian].

Turbin and Ivanov are criticized for rejecting Lysenko's theory of new species evolving by leaps from preexisting ones (cf. *PBA*, Vol. XXI, Abst. 2500), and for repeating a Darwinian error in accepting intraspecific competition (cf. *PBA*, Vol. XXIII, Absts. 1634 and 1635).

- 40 WADDINGTON, C. H.
The evolution of adaptations.
Endeavour 1953 : 12 : 134-39.

It is suggested that the current biological theory which regards evolution as being primarily the result of natural selection of random mutants does not explain the whole of the evolutionary process. Further research is required into genetic assimilation of environmental influences. Experiments with *Drosophila melanogaster* in which strains with broken or missing posterior cross-veins were produced by temperature shocks may support the author's suggestion.

- 41 DMITRIEV, V.
(Some unusual discussions).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 2 : 49-68. [Russian].

The arguments against Lysenko's theory of conversion of some species into others by Turbin and Ivanov [cf. *PBA*, Vol. XXIII, Absts. 1634 & 1635] are rejected as unscientific and conflicting with the principles laid down by the Soviet Darwinist and Marxist classics. Sukačev, editor of the *Botaničeskii Žurnal* [Botanical Journal] and *Bjulletenij Moskovskogo Obščestva Ispytatelej Prirody* [Bulletin of the Moscow Society of Naturalists], who published the papers by Turbin and Ivanov, is also criticized for some idealist and metaphysical errors of his own.

- 42 PAVLOV, N. V.
(**Evolution of species by conversion**).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 :
378-85. [Russian].

Lysenko's theory of interspecific conversion conflicts with the Darwinian concept of evolution coming about by the interplay of heredity, variability and natural selection. Darwin's principles were accepted however by the Marxist and Mičurinite classics and by Lysenko himself at the 1948 session of the Lenin Academy of Agricultural Sciences (cf. *PBA*, Vol. XVIII, Abst. 2000). Turbin's explanation of some of the reported facts upon which Lysenko's concept of evolution by interspecific conversion is founded (cf. *PBA*, Vol. XXIII, Abst. 1634) is rejected. The writer agrees with Ivanov (cf. *PBA*, Vol. XXIII, Abst. 1635) that Lysenko's new evolutionary hypothesis has various elements characteristic of formal genetics.

- 43 LEPEŠINSKAJA, O. B.
(**Invalid comments by N. V. Turbin and N. D. Ivanov on T. D. Lysenko's paper on the species**).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 :
386-88. [Russian].

Turbin and Ivanov (cf. *PBA*, Vol. XXIII, Absts. 1634 and 1635) are criticized for their disregard of Stalin's dicta on qualitative and quantitative changes in evolution and for their denial of Lysenko's assertion that Darwinian evolutionary theory has some metaphysical elements.

- 44 KULIKOV, M. V.
(**"Some new ideas in the science of biological species" by Academician T. D. Lysenko in relation to biostratigraphy**).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 :
389-400. [Russian].

Lysenko's concept of species and evolution (cf. *PBA*, Vol. XXI, Abst. 2500) is rejected and recent Soviet paleontological evidence supporting the Darwinian theory is presented. It is argued that the progress made in biostratigraphy since the eighteenth century would have been impossible had Lysenko's evolutionary principles been applied to geology.

- 45 BOBKOV, E. V.
(**The question of methods of studying evolution of new species**).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 :
401-06. [Russian].

Analyses of the reports on interspecific conversions by Jakubciner, Dmitriev and Truhinova (cf. *PBA*, Vol. XXII, Absts. 2589, 3091, 1847

and 1048) suggest that the published facts cannot, in their present form, be regarded as scientific evidence in favour of Lysenko's new evolutionary hypothesis. The use of microphotography by investigators of interspecific conversions is advocated.

- 46 ARTJUŠENKO, Z. T., ZAMJATNIN, B. N. & SOKOLOV, S. Ja.
(**A birch tree branch resembling alder**).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 :
414-18. [Russian].

At a Moscow meeting of the USSR Academy of Sciences, held on 6 February 1953, Lysenko referred to a birch branch with some modified leaves resembling those of an alder as an example of interspecific conversion. A commission set up to investigate the phenomenon found that the changes in leaf shape were due to attack by *Exoascus betulinus*.

- 47 SMIRNOV, L. A.
(**The question of an interesting instance of natural grafting between spruce and pine near Riga**).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 :
418-21. [Russian].

Abotin-Pavlov's explanation of the appearance of a spruce branch on a pine by Lysenko's theory of interspecific conversion (cf. *PBA*, Vol. XXIII, Abst. 1506) is rejected and described as inconsistent with his own earlier interpretation of the same phenomenon by natural grafting. Reference is made to a Latvian article in which Abotin-Pavlov is criticized on similar grounds.

- 48 DVORJANKIN, F.
(**For a Darwinist basis for the theory of evolution of species**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 2 : 68-76.
[Russian].

The papers by Turbin and Ivanov opposing Lysenko's theory of interspecific conversion (cf. *PBA*, Vol. XXIII, Absts. 1634 & 1635) are criticized for their neodarwinist tendency. Lysenko's evolutionary theories are regarded as rooted in Darwinism but purged of its Malthusian errors.

- 49 DVORJANKIN, F. A.
(**Darwinism and some ideas on species**).
Uspehi Sovremennoi Biologii (Advances in Modern Biology) 1953 : 35 : 291-99.
[Russian].

Turbin and Ivanov are again charged with neodarwinism (cf. Abst. 48) and their arguments

against Lysenko's theory of interspecific conversion (cf. *PBA*, Vol. XXIII, Absts. 1634 and 1635) are dismissed as deliberate misrepresentations of the principles of Soviet Darwinism.

- 50 STUDITSKIĬ, A. N.
(**For a creative solution of the problem of evolution of species**).
Uspehi Sovremennoi Biologii (Advances in Modern Biology) 1953 : 35 : 1-26.
[Russian].

The arguments of Turbin and Ivanov against Lysenko's concept of interspecific conversion (cf. *PBA*, Vol. XXIII, Absts. 1634 and 1635) are rejected in favour of the Mičurinite theory. It is claimed that the latter is supported by the recent investigations by Lepešinskaja *et al.* (cf. *PBA*, Vol. XXI, Abst. 1509) into the origin of cells from simple proteins. Both critics of Lysenko are charged with neodarwinism since they accept intraspecific competition, a Malthusian error exposed by the Mičurinites at the 1948 meeting of the Lenin Academy of Agricultural Sciences (cf. *PBA*, Vol. XVIII, Abst. 2000).

- 51 Soó, R.
Die modernen Grundsätze der Phylogenie im neuen System der Blütenpflanzen.
(**Modern principles of phylogeny in the new system of the flowering plants**).
Acta Biol. Acad. Sci. Hungar. 1953 : 4 : 257-306.

The author presents an account of phylogeny in conformity with the tenets of dialectical materialism and stresses the importance of the work done by Lysenko and Mičurin. The strobilar and pseudanthium theories and the monophyletic origin of angiosperms are discussed.

- 52 SUKAČEV, V. N.
(**The intraspecific and interspecific relations between plants**).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 : 57-96. [Russian].

Several important principles of Lysenko's theories on intraspecific and interspecific relations are rejected. Competition and mutual help are observed in plant societies comprising individuals of the same species or those of several species. Mutual relations between plants are different from those observed in human society or between animals. Competition between plants is intensified in environments favourable to the development of a plant

society or species. Overpopulation is regarded as a normal rather than an exceptional condition of any plant society. Malthus applied his theory of overpopulation exclusively to human society. Therefore it would be a grave methodological error to borrow the term "Malthusian" when dealing with overpopulation occurring in plants. The principal difference between intraspecific and interspecific competition is their outcome. In the first instance, some individuals of a species will always survive while competition between different species often results in the elimination of all individuals of some species. Darwin's concept of the role of competition in evolution must be modified in the light of evidence, now available to Soviet scientists, of various forms of intraspecific competition occurring in nature.

*CYTOLOGY.

- 53 ZIRKLE, R. E. & BLOOM, W.
Irradiation of parts of individual cells.
Science 1953 : 117 : 487-93.

A widely applicable method for high-energy irradiation of cell parts by means of proton microbeams with a diameter as small as 2.5μ is described. In mitotic cells in tissue cultures of amphibian hearts, bombardment of the chromosomes with a few dozen protons produced severe aberrations, but irradiation of the cytoplasm, spindle or centriolar region with a few thousand protons gave no detectable effects. Some of the aberrations are readily localized thus facilitating investigation of chromosome movement during mitosis. According to a footnote, similar experiments have been done with various lower plants.

- 54 PLAUT, W. S.
DNA synthesis in the microsporo- cytes of *Lilium Henryi*.
Hereditas, Lund 1953 : 39 : 438-44.

By means of observations secured by the autoradiographic technique described by Howard and Pelc (*PBA*, Vol. XXI, Abst. 2337, and Vol. XXIII, 2268), the following conclusions were reached: (1) new deoxyribose nucleic acid (DNA) is synthesized in the microsporocyte nuclei at some time during the interphase following the last premeiotic mitosis; (2) this period of synthesis ends before the leptotene chromosomes can be seen; (3) no evidence was obtained for the formation of new DNA between

* General studies, see also individual crops.

leptotene and the stage of uninucleate microspores with partially completed exines; (4) possibly either the rate of DNA synthesis or total amount of new DNA is less in the microspore nuclei than in the tapetal or parietal nuclei; and (5) the proportion of tapetal nuclei synthesizing DNA varies according to the developmental stage of the anther.

- 55 YASUZUMI, G. & YAMANAKA, T.
(Electron microscope observations in the nucleolus).
Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 111-12. [Japanese].

The nucleoli of the periplasmodium of *Tradescantia reflexa* were shown to consist of interwoven fibrils with no bounding nucleolar membrane.

- 56 ONO, T.
(The cytological basis of sex determination).
Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : 211-16. [Japanese].

The various ways in which sex chromosomes determine the sex of dicotyledonous higher plants are reviewed.

- 57 WATSON, J. D. & CRICK, F. H. C.
A structure for deoxyribose nucleic acid.
Nature, Lond. 1953 : 171 : 737-38.

It is suggested that the unit out of which the salt of the above substance is built up is a pair of helical chains, each coiled round a common axis, the sequence of atoms in the two chains running in opposite directions. The two chains are believed to be held together by hydrogen bonds between the purine and pyrimidine bases. Such a structure would present possibilities as a copying mechanism for genetic material.

- 58 WATSON, J. D. & CRICK, F. H. C.
Genetical implications of the structure of deoxyribonucleic acid.
Nature, Lond. 1953 : 171 : 964-67.

Further to their paper proposing a twin helical structure for the above substance (cf. Abst. 57), the authors suggest that self duplication of the molecule occurs by unwinding of the two component helices and subsequent attachment, by means of hydrogen bonds, of free nucleotides to the purine and pyrimidine bases of each of the component strands. Since the order of bases along the nucleic acid molecule is irregular and presumably specific, and since it is believed that adenine pairs exclusively with thymine and guanine with cytosine, a mechanism can thus be

envisaged whereby self duplication could occur. Polymerization of the free nucleotides might come about under the influence of a special enzyme or be catalysed by the preexisting nucleic acid strand. The model proposed presupposes a considerable degree of molecular uncoiling. This, it is suggested, is reflected by chromosome coiling and uncoiling during mitosis.

- 59 BROWN, G. L. & WATSON, M.
Heterogeneity of deoxyribonucleic acids.
Nature, Lond. 1953 : 172 : 339-42.

By adsorbing deoxyribonucleic acid (DNA) preparations on histone-coated kieselguhr and eluting with NaCl solutions of increasing concentrations, it was possible to fractionate the DNA into a series of components whose ratios of adenine to guanine and thymine to cytosine increased with the concentration of NaCl necessary to elute them.

- 60 WILKINS, M. H. F., STOKES, A. R. & WILSON, H. R.
Molecular structure of deoxypentose nucleic acids.
Nature, Lond. 1953 : 171 : 738-40.

The X-ray diffraction pattern obtained from orientated paracrystalline samples of the above substance provides evidence in favour of a structure based on 2 or 3 intertwined coaxial helices (cf. Abst. 58).

- 61 FRANKLIN, R. E. & GOSLING, R. G.
Molecular configuration in sodium thymonucleate.
Nature, Lond. 1953 : 171 : 740-41.

The X-ray diagram obtained from sodium thymonucleate fibre with a high water content may be interpreted as evidence for a helical structure made up of 2 coaxial molecules, these, however, suffering some mutual displacement relative to the fibre axis (cf. Abst. 57). The physicochemical properties of thymonucleic acid are believed to support the hypothesis that the phosphate groups be on the outside of the helix.

- 62 BATTAGLIA, E.
Esiste un tipo cromosomico con "centromero nucleolare" in *Nerine undulata* Herb.? (Does a chromosome type with "nucleolar centromere" exist in *N. undulata* Herb.?)
Caryologia, Pisa 1953 : 5 : 43-52.

No such nucleolar centromere was observed, its supposed existence being ascribed to a

misinterpretation of a secondary constriction in close propinquity to the nucleolus.

63 ANDERSON, N. G.

On the nuclear envelope.

Science 1953 : 117 : 517-20.

The structure and role of the nuclear membrane in genetically controlled differentiation are discussed, mainly with reference to animal cells. The evidence so far available supports the view that the nuclear envelope is a porous structure, generally permeable to macromolecules, and composed of a meshwork of fibrils coated with lipid material. The two-component structure proposed would provide a mechanism for alteration of the permeability of the envelope, possibly in a cyclical manner.

64 PFEIFFER, H.

Neue Versuche zur Leptonik intermitotischer Zellkerne. (New experiments on the leptones in intermitotic cell nuclei).

Exp. Cell Res. 1951 : 2 : 279-83.

As a contribution to the study of the orientation of the protein component of the nucleus, an optical technique was devised for elucidating the orientation of the leptones of the polypeptide chains of the chromosome proteins.

65 BOOTHROYD, E. R.

The reaction of *Trillium* pollen-tube chromosomes to cold treatment during mitosis.

J. Hered. 1953 : 44 : 3-9.

When pollen tubes of *T. erectum* cultured at room temperature were transferred to 3° C, mitosis was arrested. Division proceeded slowly at 6° C however; visible differentiation of heterochromatic and euchromatic segments of the chromosomes corresponded to the differentiation previously observed during cold treatment of root tips (cf. *PBA*, Vol. XV, Abst. 21). The total length of the chromosome complement at metaphase was considerably less at 6° C than at room temperature. Since chromosome arms with long segments of heterochromatin were less contracted than euchromatic arms at 6° C, it is suggested that the normal prophase contraction of heterochromatin is decreased by low temperatures, whereas contraction of euchromatin is enhanced.

Contrary to Bailey (cf. *PBA*, Vol. XX, Abst. 85), the author considers that consistent patterns of differential segments in chromosome complements may facilitate an analysis of intraspecific diversification and evolution of subspecies and varieties.

66 MAZIA, D.

Cell division.

Sci. Amer. 1953 : 189 : No. 2 : 53-63.

Research on the mechanism of mitosis is reviewed. Particular reference is made to the successful isolation of the mitotic apparatus of animal cells by dissolving the rest of the cell with the detergent-Duponol (sodium lauryl sulphate), at the University of California, having first stabilized the protein fibres of the spindle by converting potential disulphide bridges between protein molecules into actual bridges by oxidation with hydrogen peroxide. A natural detergent, digitonin, also liberates the mitotic apparatus but without use of hydrogen peroxide; thus natural polymerization of protein molecules during spindle formation can be studied, especially with the polarization microscope.

67 GENEVES, L.

Influence du froid prolongé sur les mitoses de méristèmes radiculaires. (Influence of prolonged cold on the mitoses of root meristems).

CR Acad. Sci. Paris 1953 : 236 : 113-15.

Prolonged treatment (7 days) at 0° C reduces mitotic activity in root tips of *Allium cepa* but does not entirely inhibit it. On replacing the material in an environment at normal temperature, normal activity recommences.

68 SHAW, G. W.

Guanidine nitrate and the *Allium* test.

Caryologia, Pisa 1953 : 5 : 14-24.

The physiological and cytological effects of guanidine nitrate were studied by means of the standard *Allium* test devised by Levan (cf. *PBA*, Vol. XIX, Abst. 2365). All concentrations except the lowest reduced the frequency of mitosis. The most marked cytological effect was stickiness. High concentrations caused restitution, nuclear shrinkage and extrusion of Feulgen-negative nuclear droplets. Calculation of the thermodynamic activity indicated that the action of the substance is specific and chemical.

69 TSCHERMAK-WOESS, E. & DOLEŽAL, R.
Durch Seitenwurzelbildung induzierte und spontane Mitosen in den Dauerge-
weben der Wurzel. (Mitosis induced
by the formation of lateral roots and
spontaneous mitosis in the permanent
tissues of the root).

Öst. Bot. Z. 100 : 358-402.

Seventy-one species of Spermatophyta and *Azolla* were investigated. Mitosis in the stele was

found in all species, and in 53 cases in the cortex. In 31 instances mitosis in the cortex was induced exclusively by the growth of secondary roots, in 20 cases both spontaneous and induced mitosis was found, and in 2 cases the mitosis was purely spontaneous. In some species both diploid and polyploid cells were found, tetraploid, octoploid and occasionally 16-ploid cells occurring. Diploid cells and cells with different degrees of polyploidy occur side by side. Polyploidy was also found in the stele, but in most species not to the same extent, or to the same degree, as in the cortex. Division in the cortex does not usually result in an increase in the size of the cell. *Beta*, *Chenopodium* and *Rumex* showed disturbances at anaphase in high polyploid cells.

- 70 HAGA, T.
Failure of pairing of a particular chromosome pair in *Trillium kamtschaticum* Pall.
Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 72-74. [Japanese].

An exception was found in a specimen of *T. kamtschaticum* to the general rule that the frequency of failure to pair at the first meiotic metaphase is inversely proportional to chromosome length. Data on the plant's behaviour at meiosis are presented, and it is suggested that this anomaly is caused by the anomalous structure of chromosome C.

- 71 DE SERRES, F. J. & GILES, N. H.
The effect of radiation dose fractionation on chromosome aberration frequencies in *Tradescantia* microspores. I. Studies with X-rays.
Genetics 1953 : 38 : 407-15.

Experiments were undertaken to test the validity of the contrasting observations of Lane and of Sax and Luippold concerning the effects of fractional dosage on chromosomal reunion and restitution after breakage (cf. *PBA*, Vol. XXI, Abst. 2352 and Vol. XXII, Abst. 2446). Single doses of 175 and 350 r. were administered to *T. paludosa* pollen without fractionation; doses of 350 r. were also given in two equal parts, with intervals of 1, 2, 4, 8 or 12 hours between fractions. Neither under controlled conditions of lighting and temperature, nor in an uncontrolled environment, were results obtained in accordance with Lane's rejection of Sax's theory of rapid reunion after breakage. Observations in fact supported Sax's conclusions; fractionation of X ray doses reduced the yield of two-hit aberrations and no recovery from this reduction occurred when the period

between the half doses was greater than 4 hours. The authors therefore confirm the suggestion of Sax and Luippold that Lane's contrasting data resulted from the examination of an inadequate number of cells.

- 72 LA COUR, L. F. & RUTISHAUSER, A.
Chromosome breakage experiments with endosperm : sub-chromatid breakage.
Nature, Lond. 1953 : 172 : 501-02.

Anaphase nuclei in the endosperm of *Scilla sibirica*, subsequent to treatment with a dose of 54 r. at 18° C, showed configurations involving intrachromatid and interchromatid associations at nonhomologous loci, and resulting from sub-chromatid breakage and reunion in coiled and overlapping chromatids at prophase. Sub-chromatid breakage was not induced by treatment during the resting stage and metaphase. Attention is briefly drawn to the probability of a causal relationship between subchromatid breakage and delayed mutation.

- 73 KIRBY-SMITH, J. S. & DANIELS, D. S.
The relative effects of X-rays, gamma rays and beta rays on chromosomal breakage in *Tradescantia*.
Genetics 1953 : 38 : 375-88.

X rays of 60 kev. mean energy proved twice as effective as mixed 1.17 and 1.33 Mev. γ rays from Co^{60} or β rays of 400 kev. from P^{32} in producing chromosomal aberrations in dry *Tradescantia* pollen. This is in agreement with predictions based on the relative ion density produced by these radiations. A slight but significant departure from linearity in the relation between radiation dose and aberration frequency, with respect to isochromatid breaks, was observed for the three types of radiation (cf. *PBA*, Vol. XVI, Abst. 1030). The relative magnitude of the two-hit component is considerably greater for γ rays or high energy β rays than for X rays.

- 74 GILES, N. H., DE SERRES, F. J. & BEATTY, A. V.
The effect of radiation dose fractionation on chromosome aberration frequencies in *Tradescantia* microspores. II. Studies with fast neutrons.
Genetics 1953 : 38 : 416-20.

In conjunction with the reinvestigation of the effects of fractional doses of X rays on aberration frequency (cf. Abst. 71), *T. paludosa* pollen was also treated with single doses (25 N) of fast

neutrons without fractionation and with similar doses in two equal fractions at intervals of 1, 2, 4, 8 and 12 hours. The frequencies of interchanges and interstitial deletions were, however, unaffected by fractionation. Aberration frequencies obtained from a single dose of 12.5 N were approximately half those produced by 25 N. The data are thus in agreement with the single-hit hypothesis for neutron-induced interchanges in *Tradescantia* (cf. *PBA*, Vol. XIV, Abst. 130).

- 75 D'AMATO, F.
Rapporti fra costituzione chimica e attività mutagenica nelle acridine. Dati riassuntivi. (**Relation between chemical constitution and mutagenic activity in the acridines. Summarized data**).
RC Accad. Lincei 1952 : 12 : 612-17.

Data are given on the properties of 51 acridine derivatives, some of which have proved mutagenic and others not; there was the closest correspondence between the mutagenic action of the different compounds and their bactericidal activity and, it would seem, also their ionizing capacity and mitoclastic properties.

- 76 TANAKA, N.
(**The problems of aneuploidy**).
Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 185-90. [Japanese].

A summary is given of the author's researches into the aneuploid series constituted by the genus *Carex*. The original papers utilized have been summarized already in *Plant Breeding Abstracts*.

- 77 MARTINOLI, G.
Effetti citologici indotti da raggi X su meristemi di *Scilla obtusifolia* Poir. (**Cytological effects induced by X rays on meristems of *S. obtusifolia* Poir.**).
Caryologia, Pisa 1953 : 5 : 53-85.

The 4 pairs of chromosomes of the caryogram of the species in question can be distinguished morphologically, and its root tips after subjection to various dosages of X rays showed a number of characteristic effects, which included fragmentation and various agglutination phenomena, in addition to which c-mitosis occurred relatively frequently, leading to the formation of cells with 4n, 8n and occasionally more chromosomes; various aberrant numbers such as 4n = 20 were also observed.

The prophase was the most sensitive to the

effects of X rays; it is clear that the c-mitotic effects result from the action of the irradiation upon the spindle, and the other effects from its action upon the chromosomes themselves.

- 78 FUJIWARA, I.
(**On the relationship between polyploidy and the number of chloroplasts in the palisade parenchyma cells in *Chrysanthemum***).
Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : p. 229. (Abst.). [Japanese].

A comparative study was made of plastid number in 2x, 3x, 4x, 6x, 8x and 10x representatives of the genus. Though a general tendency for cell size and plastid number to increase with chromosome number was noted, the degree of increase of cell size with polyploidy was not always proportional.

- 79 NEWCOMER, E. H.
A new cytological and histological fixing fluid.
Science 1953 : 118 : p. 161.

A stable fixative having the following formula (by volume) has proved satisfactory for plant materials such as root tips of *Allium* and microsporocytes of *Tradescantia*: 6 parts isopropyl alcohol, 3 parts propionic acid, 1 part ether (petroleum), 1 part acetone and 1 part dioxane. Information is given on a simplified procedure for subsequently making permanent preparations of Feulgen or propionic carmine smears.

- 80 MELANDER, Y. & WINGSTRAND, K. G.
Gomori's hematoxylin as a chromosome stain.
Stain Tech. 1953 : 28 : 217-23.

The chromic hematoxylin of Gomori forms a good stain for chromosomes after hydrolysis of the tissue in warm 1-N hydrochloric acid. Details of the technique of making squash preparations of *Allium* root tips, using this stain, are included.

- 81 SHARMA, A. K. & BAL, A. K.
Coumarin in chromosome analysis.
Stain Tech. 1953 : 28 : 255-57.

Root tips of *Allium cepa* and other monocotyledons were soaked for 2.5-3.0 hours at 25-27° C in saturated aqueous coumarin solution, and then stained in a mixture of N HCl and 2% aceto-orcein (1 : 9 by volume) over a flame for 3 or 4 seconds. Immediately afterwards the root tips were squashed in 1% orcein solution. Preparations could be kept about one week.

***BOTANY**

- 82 GLINKA, N. V.
(The method of developing a new agrobiological theory and the most important errors of N. P. Krenke's critics).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 20-24. [Russian].

The development of a new general biological theory, based on the study of phasic development in plants by Lysenko, and incorporating Krenke's principles of cyclic senescence and rejuvenation, and some recent evidence of mutual relations between growth and development in plants, obtained by Sabinin, Vladimirov and the present writer, is advocated. Various Soviet writers, notably Ovčinnikov, Kostrjukova, Gureckaja, Gupalo and Kružilin are said to be mistaken in their uncritical acceptance of Lysenko's, and rejection of Krenke's, theories.

- 83 DVORJANKIN, F. A.
(The theories of phasic development and of diminishing vitality).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 25-32. [Russian].

The author maintains that the theory of phasic development by Lysenko forms a sound materialist foundation for biological research on its own, and cannot be improved by borrowing any principles from Krenke's theory of cyclic senescence and rejuvenation of plants, as advocated by Glinka (cf. Abst. 82). Some of Krenke's experiments are regarded as sound, but his conclusions and the resultant theory are rejected, since it is founded on several fallacious Weismannite concepts, including that of diminishing vitality of plant individuals and plant species.

DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

- 84 Adaptation in micro-organisms.
Nature, Lond. 1953 : 172 : 235-36.

A summary is given of contributions to the symposium on the above subject, held by the Society for General Microbiology, during 14-15 April 1953, at the Royal Institution, London. R. Y. Stanier distinguished evolutionary adaptation from physiological adaptation. The latter, in which the cells of a population meet sudden change in the environment, is of considerable importance in microbial populations.

A. C. R. Dean and C. Hinshelwood discussed the distinction between adaptations which could be attributed to mutant selection and those which are based on changes in the whole population. They have secured evidence that the ability of *Aerobacter aerogenes* to grow in the presence of proflavine or chloramphenicol is not due to selection of drug-resistant strains.

A. W. Ravin considered the occurrence, in populations of *Ae. aerogenes*, of cells with varying ability to utilize citrate and other intermediates of the tricarboxylic acid cycle. Normally growth occurs after a lag, during which nearly the whole of the population develops the ability to utilize these acids. This ability is lost with subculture on glucose, but is regained upon further subculture on citrate. In any culture, some mutant cells unable to utilize citrate exist, their relative number being increased by ultraviolet irradiation. Cultures derived from such cells show a permanent loss in ability to utilize citrate. In the discussion, J. Monod suggested that such heterogeneity might be due to the fact that some cells, but not others, have energy reserves or intermediate substances necessary for synthesising the adaptive enzyme required for growth. M. R. Pollock later followed up this point by referring to the "quantum mechanics of bacteria." M. R. Pollock, M. Cohn, J. Monod, S. Spiegelman, H. O. Halvorson and R. Knox contributed other papers on the first day discussing the mechanism of synthesis of adaptive enzymes.

The first papers for the second day dealt with drug resistance. E. P. Abraham pointed out that in some cases the development of resistance was due to mutant selection, whereas in others it was apparently the result of adaptive changes in most cells of the population. He emphasized the difficulty of determining which type of change had occurred, finding the replica technique of Lederberg and Lederberg the only method capable of making the distinction (cf. *PBA*, Vol. XXII, Abst. 2498). M. Barber referred to the wide variation, both heritable and nonheritable, among strains of *Staphylococcus aureus* capable of growing in the presence of antibiotics. D. A. Mitchison discussed variations in resistance among organisms isolated from hosts after streptomycin and isoniazid therapy.

L. F. Hewitt analysed the control that bacteriophages may exert over evolution in bacteria. G. H. Beale described several types of adaptation in *Paramecium*, all of which arose during

* General studies, see also individual crops.

asexual reproduction. Variation in antigenic properties depended upon a cytoplasmic alteration. Other adaptations probably have a similar origin; nevertheless, the ability of a strain to adapt to given conditions is genetically controlled.

L. F. L. Clegg reported investigations on thermophilic organisms which grow optimally at temperatures above 50° C. W. Brown and R. K. S. Wood dealt with the adaptation of fungi to their natural habitat.

- 85 GRANHALL, I.
Köldhårdighetens växtfysiologiska grundvalar. (**The physiological basis of cold resistance in plants**).

Nord. JordbrForskn. 1953 : 35 : 36-51.

This address, read at the Bioclimatic Research Congress held in Norway in 1951, deals with: injury and death by cold; artificial freezing tests; chemical and physiological characteristics of plant cells and tissues; ice formation in soil and plant; and thawing and climatic and other external factors affecting hardiness in various crop plants.

A brief section on genetically and cytologically conditioned differences in hardiness refers to the findings of Swedish and German investigators.

- 86 BACK, K. J. C. & WOODS, D. D.
Studies with a strain of *Bacterium coli* requiring citrulline and a pyrimidine for growth.

Biochem. J. 1953 : 55 : No. 1 : xii-xiii.

Mutant R 185-482 requires citrulline (or arginine) and uracil (or cytosine) for growth. Reversions have always been to growth without either substance; the double requirement is therefore probably due to a mutation at a single locus. Uracil could be replaced by carbamylaspartate. Growth on carbamylaspartate was inhibited by the higher concentrations of carbamylglutamate used. After prolonged incubation, however, growth occurred with the higher concentrations of carbamylglutamate, apparently as the result not of reversion but of the development of resistance. Growth on uracil was not affected by carbamylglutamate; the latter could not replace citrulline for growth.

- 87 NEWCOMBE, H. B.
Radiation-induced instabilities in *Streptomyces*.

J. Gen. Microbiol. 1953 : 9 : 30-36.

Exposure of the spores to ultraviolet and γ radiation induced heritable changes affecting colonial morphology and colour. The alterations were occasionally stable, but the majority

Diseases, Injuries, Bacteria, Fungi, Viruses *continued*.

consisted of unstable types which persisted indefinitely in most lines of descent, and which gave rise to characteristic proportions of new variants, each with its own pattern of instability. The curve for ultraviolet dose/effect showed the peak and decline typical of mutation in many other organisms. The changes in *Streptomyces*, however, differed from those in other organisms in two ways: they could be induced with much greater frequencies than in other organisms, 30-60% of the colonies being affected; and γ irradiation was as effective or more so than ultraviolet treatment. It is therefore suggested that the alterations were due to chromosomal rearrangements, rather than to gene mutations. Instabilities similar to the induced ones arose spontaneously but with a much lower frequency.

- 88 DONDERO, N. C. & ZELLE, M. R.
Observations on the formation and behavior of "conjugation" cells and large bodies in *Azotobacter agile*.

Science 1953 : 118 : 34-36.

Cells which resulted from unequal division and might be erroneously interpreted as conjugating cells were observed; their occurrence is ascribed to the unfavourable environmental conditions of the culture method. The sporadic production of large, irregularly shaped bodies is also reported. When viable, the large bodies gave rise to normal ellipsoidal cells, large bodies or both. The resulting large bodies were also nonviable, or yielded a mixed lineage. Normal cells derived from large bodies either gave rise to relatively stable lines, rarely producing large bodies, or unstable lines of apparently normal cells giving rise to large bodies at a much higher rate than usual. Since the occurrence of large bodies was clonal, it was probably a genetic effect. To explain this phenomenon, a mutation is postulated which had no influence at low ratios of mutant to normal nuclei, but which interfered with cell division, but not with nuclear division, when the nuclear ratio exceeded a critical value.

- 89 BÉGUET, M.
Étude des conditions d'apparition des types dits "mutants" dans les cultures microbiennes. (Étude faite sur *B. prodigiosus*). [Study on the conditions of appearance of so-called "mutant" types in microbial cultures. (Study made with *B. prodigiosus*)].

CR Soc. Biol., Paris 1953 : 147 : 260-61.

A series of variants of *Bacillus prodigiosus* were produced from the progenies of single cells grown

under different conditions of pH and surface tension in a peptone liquid medium. These variants, however, readily revert to the original type and are not regarded as true mutations.

- 90 KELLENBERGER, E. & HUBER, L.
Contribution à l'étude des équivalents des mitochondries dans les bactéries. (**Contribution to the study of the equivalents of mitochondria in the bacteria**).

Experientia, Basel 1953 : 9 : 289-91.

Evidence of the existence of "chondrioids" in strain B of *Escherichia coli* and in *Bacillus cereus* was obtained with the electron microscope and with the phase-contrast microscope.

- 91 DELAMATER, E. D.
Cytologic evidence for the occurrence of cellular and nuclear fusion in *Bacillus megaterium*.

Bull. Torrey Bot. Cl. 1953 : 80 : 289-98.

Cellular fusion, accomplished by means of delicate conjugation tubes, has been observed in *B. megaterium*. The formation of enlarged nuclei after cellular fusion suggests that a diploid phase exists. This is substantiated by photomicrographs of mitotic stages in which six chromosomes have been counted, in contrast with the three previously found in the vegetative phase (cf. *PBA*, Vol. XXII, Absts. 115 and 1658). Fusion is therefore interpreted as a sexual process.

- 92 WRIGHT, B. E.
Specific suppression by glycine of the phenotypic expression of partially reverted glycineless *E. coli* mutants.

Nature, Lond. 1953 : 172 : 308-09.

Using solid media, on which selection phenomena are limited since the cells are spatially fixed, it has been demonstrated that the growth of a partially reverted strain, and also of increasingly glycine-independent mutants, was phenotypically suppressed on minimal medium if the strain had been previously grown in the presence of glycine. Such a situation offers a mechanism for the suppression of independent mutants in populations of dependent cells; the phenomenon should therefore be considered in studies of reversion frequency.

- 93 SIMONOVITCH, L.
Biochemical modifications of the bacterial host during bacteriophage development.

Un. Int. Sci. Biol. 1953 : Sér. B : 265-72.

A survey of biochemical changes in bacteria infected with virulent and temperate phages

refers to the similarity between patterns of deoxyribonucleic acid synthesis in both systems.

- 94 WOLLMAN, E. L.
Sur le déterminisme génétique de la lysogénie. (**Genetic determinism of lysogenesis**).

Un. Int. Sci. Biol. 1953 : Sér. B : 281-93.

The genetics of lysogenesis was studied in crosses between lysogenic and nonlysogenic strains of *Escherichia coli*. Lysogenesis appeared to be linked with the capacity for galactose fermentation and sensitivity to lysis with the capacity to utilize maltose. These results are similar to those obtained by Lederberg and Lederberg (cf. *PBA*, Vol. XXIII, Abst. 1720).

- 95 **What's new in farm science. Annual Report of the Agricultural Experiment Station, Wisconsin.**

Bull. 1953 : No. 500 : Pt. 1 : Pp. 80.

Antibiotics. By exposing very young streptomycin-producing bacteria to heavy doses of phage, a strain has been developed which is resistant to phage attack.

- 96 GOEBEL, W. F. & JESAITIS, M. A.
Chemical and antiviral properties of the somatic antigens of phase II *Sh. sonnei* and of a phage-resistant variant, II/3, 4, 7.

Un. Int. Sci. Biol. 1953 : Sér. B : 66-72.

From a comparison between the antigens of phage-susceptible *Sh. sonnei* and its mutant, resistant to T3, T4 and T7, it is assumed that differences in the carbohydrate components determine the serological specificity and antiviral activities exhibited by each antigen. Mutation from phage susceptibility to resistance may involve changes in enzyme systems responsible for the elaboration of the carbohydrate portion of the antigen.

- 97 EPHRUSSI-TAYLOR, H.
Transformations allogènes du pneumocoque. (**Allogenic transformations of *Pneumococcus***).

Exp. Cell Res. 1951 : 2 : 589-607.

Investigations have shown that, when a *Pneumococcus* strain containing a mutant transforming principle (TP) is acted on by a different TP mutant, allogenic transformations occur, involving the production of bacteria with completely or partially restored capsule synthesis, the degree of restoration depending on the particular pair of TP concerned (cf. *PBA*, XXIII, Abst. 5). Apparently, the frequency of

such allogenic transformations also depends on the properties of the TP pair involved. The discovery of a new TP mutant, which has never been found in nature, is announced: it induces in *Pneumococci* a phenotype resembling that of SIII-2.

- 98 STAMPS, D. J.
Variation in a strain of *Phytophthora cactorum*.
Trans. Brit. Mycol. Soc. 1953 : 36 : 248-53.

From a single zoospore a range of colonial types of varying stability and considerable variation as regards morphological and other characteristics was obtained. The variants were maintained to some extent by propagation from single zoospores and oospores but many of the offtypes showed ready reversibility to the parent type.

- 99 WHITEHOUSE, H. L. K.
The significance of some sexual phenomena in the fungi.
Indian Phytopath. 1951 : 4 : 91-105.

A general review of heterothallism distinguishes between morphological differentiation of the sexes and the fundamental criterion of alternation of nuclear fusion and meiosis, with special reference to the life cycles of Ascomycetes and relationships between the Ustilaginales, Uredinales, Hymenomycetes and Gasteromycetes.

- 100 BARNETT, H. L. & STALEY, J. M.
Isolation of compatibility types of *Endoconidiophora fagacearum* from oak wilt trees naturally and artificially inoculated.
Phytopathology 1953 : 43 : 341-43.

Few naturally infected oaks in West Virginia yielded isolates of both A and B compatibility types of *E. fagacearum* (cf. *PBA*, Vol. XXIII, Abst. 127), but approximately equal numbers yielded either A or B isolates. Numerous trees inoculated with mixtures of conidia from both compatibility types were later found to be infected by only one compatibility type, indicating that selection had resulted in the survival of one or other type in each tree. An exceptional tree from which a mixed isolate was retrieved was discovered.

- 101 PONTECORVO, G. & SERMONTI, G.
Recombination without sexual reproduction in *Penicillium chrysogenum*.
Nature, Lond. 1953 : 172 : 126-27.

The technique devised by Roper and Pontecorvo for synthesizing heterozygous diploid

strains of *Aspergillus* (cf. *PBA*, Vol. XXIII, Abst. 1725 and p. 663) has been successfully applied to *P. chrysogenum*, the diploids obtained giving rise to forms recombining the growth-factor requirements and other properties of the original strains.

- 102 RAPER, K. B. & FENNELL, D. I.
Heterokaryosis in *Aspergillus*.
J. Elisha Mitchell Sci. Soc. 1953 : 69 : 1-29.

The following three distinct types of heterocaryotic heads were found when two mutants, or mutant and parent strains, of *A. fonsecaeus* were grown in mixed cultures (cf. *PBA*, Vol. XIX, Abst. 1644). In mixtures of a lightly pigmented mutant and a stock with normal black pigmentation, heterocaryotic heads with pigmentation intermediate between the two parents were formed. In mixtures of two lightly pigmented strains, the heads were in most cases black, resembling the wild type. In some combinations of lightly pigmented mutants, large black heads presumed to be heterocaryons developed, which, upon conidial analysis, yielded only pure populations of a single mutant. No satisfactory explanation of the latter type has been obtained. Mutant strains varied very considerably in their capacity to form heterocaryons. Cultural conditions exerted a marked influence on the degree of heterocaryosis. *A. fonsecaeus* is of economic interest as a good producer of citric or gluconic acid; the possible exploitation of heterocaryotic vigour is therefore worth consideration. The formation of heterocaryotic heads in mixed plantings of parent and albino strains has been demonstrated in *A. clavatus*, *A. fumigatus* and *A. terreus*.

- 103 JINKS, J. L.
Heterokaryosis : a system of adaptation in wild fungi.
Proc. Roy. Soc. 1952 : 140 : Ser. B : 83-99.

Single spore isolates of a wild heterocaryon (4) of *Penicillium cyclopium* gave rise to homocaryotic colonies, designated 4A or 4B, from which heterocaryons could be resynthesized (cf. *PBA*, Vol. XXII, Abst. 2507). The ratios of A and B nuclei in the resynthesized heterocaryons were shown to change on different media, certain ratios being characteristic of specific substrates. Variation in nuclear ratio affords a means of immediate somatic adjustment to a changing environment. Such flexibility is of particular advantage to a saprophyte. It is however emphasized that the

somatic adaptation characteristic of heterocaryosis is limited, with respect to evolution, by the lack of opportunity for genetic recombination.

- 104 REES, H. & JINKS, J. L.
The mechanism of variation in *Penicillium heterokaryons*.

Proc. Roy. Soc. 1952 : 140 : Ser. B : 100-06.

Cytological evidence is presented to show that readjustment of the ratios of the two kinds of nuclei in heterocaryons of *P. cyclopium* takes place in the hyphal tips (cf. Abst. 103). The differential rates of division of the heterocaryotic nuclei are, presumably, cytoplasmically controlled by the same process as that determining simultaneous division of adjacent nuclei in stable heterocaryons or homocaryons. After an adjustment, the genetic balance is retained by interaction between nuclei and may be influenced by the cytoplasm in which the genetic balance was established. Cytoplasmic connexions between multinucleate cells may be of significance with respect to this genetic interaction.

- 105 NEWMAYER, D. & TATUM, E. L.
Gene expression in *Neurospora* mutants requiring nicotinic acid or tryptophan.

Amer. J. Bot. 1953 : 40 : 393-400.

Analyses of the biochemical requirements of three strains of *Neurospora crassa*, 65001, 39401 and C 86, characterized by mutation at a single locus (*nt*), demonstrate the influence of a number of modifying genes which differentiate at least four phenotypically distinct classes of mutants, in which different biosynthetic reactions appear to be blocked (cf. *PBA*, Vol. XXIII, Abst. 132). Each class shows a distinctive response to the series of precursors of nicotinic acid. The basic effect of the *nt* mutation is thought to be a partial block in the conversion of tryptophane to nicotinic acid. The expression of *nt* can be altered not only by modifying genes but also by a variety of external factors, the most effective being p-aminobenzoic acid which stimulates growth on anthranilic acid; the stimulation is probably due to catalytic action rather than conversion to one of the series of precursors.

- 106 BONNER, D. M.
The genetic control of enzyme formation.

Phosph. Metabolism 1952 : 2 : 153-63.

The current status of knowledge concerning relationships between genes and enzymes is

reviewed, with particular reference to the problem of protein biosynthesis in mutant strains of *Neurospora* (cf. *PBA*, Vol. XXIII, Abst. 5). The suggestion that enzyme formation occurs in cytoplasmic particles is examined. Although the inheritance of the capacity to produce an enzyme would depend on the cytoplasmic transmission of the corresponding particle, the ability of particles to replicate in an active form is genetically controlled. Thus a particulate system is as compatible with available genetic data as a concept involving genes as templates of enzyme formation.

- 107 STEVENS, C. M. & MYLROIE, A.
Production and reversion of biochemical mutants of *Neurospora crassa* with mustard compounds.

Amer. J. Bot. 1953 : 40 : 424-29.

Numerous biochemically deficient mutants were obtained by treating *N. crassa* Em 5256 A x Em 5297a with mustard gas and n-butyl 2-chloroethyl sulphide. Four of seven mutants requiring either p-aminobenzoic acid or leucine reverted to nutritional independence on being exposed to the mutagens a second time. Genetic analyses showed that reversion in the mutants requiring p-aminobenzoic acid was in some cases due to the mutation of a suppressor at a different locus, and in others to a back mutation; all reversions in mutants requiring leucine appeared to be the result of back mutations.

- 108 SUSSMAN, A. S. & MARKERT, C. L.
The development of tyrosinase and cytochrome oxidase activity in mutants of *Glomerella cingulata*.

Arch. Biochem. Biophys. 1953 : 45 : 31-40.

Cytochrome oxidase activity in the five mutants studied was found to be constant throughout mycelial development, the enzyme being localized on mitochondrion-like particles. Two of the mutants were characterized by an almost complete absence of tyrosinase activity; in the remaining three, tyrosinase activity changed markedly during development and was concentrated in the supernatant obtained from centrifuging the mycelial brei.

- 109 HOROWITZ, N. H. & FLING, M.
Genetic determination of tyrosinase thermostability in *Neurospora*.

Genetics 1953 : 38 : 360-74.

The inheritance of tyrosinase thermostability was studied in crosses between T^S and T^L strains of *N. crassa* which produce thermostable

and thermolabile tyrosinase, respectively. Segregation ratios showed that thermostability at 59° C on a tyrosine substrate is controlled by a pair of alleles, designated T^S and T^L ; the tyrosinase produced by strains carrying T^S is characterized by a half life of at least 30 mins. at this temperature, whereas strains carrying T^L produce tyrosinase with a half life of only 3-4 mins. Numerous tests have failed to disclose the presence of any substance capable of causing differences in stability. It is therefore assumed that the alleles determine a structural dissimilarity between the two enzymes, thus providing evidence of qualitative alteration of an enzyme as a result of gene substitution. These conclusions are discussed in relation to the template theory of enzyme synthesis.

- 110 DeLAMATER, E. D., YAUERBAUM, S. & SCHWARTZ, L.

The nuclear cytology of *Eremascus albus*.

Amer. J. Bot. 1953 : 40 : 475-92.

Sexual fusion in *E. albus* was followed by meiosis and post-meiotic mitosis, essentially similar to the processes in higher plants. The haploid chromosome number was found to be 6. The nucleus and central vacuole were separate. Certain anomalies were observed, notably asci with spore numbers above or below the normal 8.

- 111 KOSIKOV, K. V.

(Experimental proof of directed variability of the enzymic properties of yeasts when grown upon a specific substrate).

Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952 : No. 19 : 199-221. [Russian].

Several strains of *Saccharomyces globosus* produced cells capable of fermenting sucrose when cultured for 225 days in a sucrose solution. No cells capable of lactose fermentation were obtained by this method. The above strains did not acquire a capacity for growth upon sucrose when cultured in a lactose solution. The results are regarded as a proof of directed changes in heritable properties and of the fallacy of the Morganist concept of spontaneous mutation.

- 112 MAGNI, G. E., BRAZZOLA, A. M., & BOLLEA, F.

Mutazioni di caratteri morfologici nei lieviti asporigeni. (Mutations of morphological characters in asporogenous yeasts).

Atti Ist. Bot. Univ. Lab. Crittogam. Pavia 1953 : 10 : Ser. 5 : 161-72.

White, pink and yellow mutants were observed in *Rhodotorula mucilaginosa* and white mutants

in *Rh. rubra*. Similar mutants occurred in these and other species after treatment with ultra-violet rays. Some of the white mutants have been observed to mutate back to red with equal frequency. Rough mutants also occurred both spontaneously and after irradiation, and these too have given frequent back mutations towards the original type.

Other variations that occurred occasionally in irradiated cultures were filamentous forms of *Rh. rubra*, morphologically resembling the genus *Mycocandida*, and nonfilamentous forms in *Candida krusei* and *C. macedoniensis*, which resembled *Torulopsis* morphologically but retained all the biochemical characteristics of the initial species.

The relative frequency of colour mutations makes the present distinction between the genera *Rhodotorula* and *Torulopsis* untenable.

- 113 SUBRAMANIAM, M. K. &

RANGANATHAN, B.

Are torulae haploid ?

Nature, Lond. 1953 : 172 : 628-29.

During mitosis in an asporogenous strain of *Candida utilis*, two chromosomes were observed, from which four daughter chromosomes were produced, separating as two pairs at early anaphase; one pair migrated to the bud. On the basis of this and other evidence, it is suggested that asporogenous strains are not necessarily haploids; torulae may be sterile diploids (cf. *PBA*, Vol. XXII, Abst. 972).

- 114 MAGNI, G. E.

Analisi della ploidia in alcuni generi di lieviti asporigeni. (Analysis of ploidy in certain genera of asporogenous yeasts).

Atti Ist. Bot. Univ. Lab. Crittogam. Pavia 1953 : 10 : Ser. 5 : 89-97.

X ray studies on 19 strains belonging to the genera *Torulopsis*, *Rhodotorula* and *Candida* gave, for the most part, survival curves with one peak, which would indicate that they are haploid. *T. pulcherrima* and *T. neoformans* gave curves which indicated them to be diploid and it is pointed out that these two species have occasionally been reported as forming monosporous asci, and should hence be removed from the genus *Torulopsis*.

- 115 DURAISWAMI, S., SREEPATHI RAO, S. K. & SUBRAMANIAM, M. K.

Extra reproduction of a chromosome in yeast.

Experientia, Basel 1953 : 9 : 293-94.

The creation of yeast cells with three chromosomes is described in two strains of diploid

($2n = 2$) yeast. It is suggested that they arose as the result of mitotic aberration, namely by an extra division of one of the two original chromosomes in the parent cell. The triploids proved highly unstable.

- 116 SARACHEK, A. & LUCKE, W. H.
Ultraviolet inactivation of polyploid *Saccharomyces*.
Arch. Biochem. Biophys. 1953 : 44 : 271-79.

A comparative analysis of the sensitivity of numerous n , $2n$, $3n$ and $4n$ strains of *Saccharomyces* to ultraviolet radiation has shown that all survival curves are sigmoid. The rate of logarithmic inactivation increases with increasing polyploidy; strains with the same degree of polyploidy, however, exhibit differential rates of inactivation within the range characteristic for a particular chromosome complement.

- 117 MITRA, K. K.
Studies on the mutagenic action of chemical and physical agencies on yeasts. VI. Effect of chrysene on the rate of growth and fermentation of the diploid brewery yeast.
J. Indian Inst. Sci. 1953 : 35 : 239-46.

Chrysene stimulated the rate of growth of diploid brewers' yeast, but adversely affected the fermentation rate under anaerobic conditions. The earlier attainment of the end of the logarithmic phase of growth in the presence of chrysene is considered to be indicative of induced genetical diversity. Compared with the parental diploid strains, chrysene-induced tetraploids showed an increase in fermentative ability similar to that obtained with a tetraploid secured by acenaphthene treatment (*PBA*, Vol. XXIII, Abst. 960).

- 118 HIRSCHHORN, E.
Variaciones en *Ustilago zeae*. (Variations in *U. zeae*).
Idia, 1953 : No. 61 : p. 16.

Reference is made to an anomalous form distinguished by abnormal chlamydospores, mycelium and sporidia; it arose after treatment of *U. zeae* with formaldehyde vapour.

- 119 INO, T.
Reversional mutations in the methionine-requiring strain of *Ustilago maydis*.
Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 79-85.

Rates of spontaneous and induced reverse mutation in the methionine-requiring mutant strain 4-24 of *U. maydis* were studied. Spontaneous reverse mutations occurred at the rate of

3.0×10^{-7} per cell per division, this rate being increased to a maximum of 10^{-4} by X-irradiation or chemical treatment.

Twenty clones of reverse mutants were examined. Sixteen of these behaved like the original strain of *U. maydis*; the remaining four, designated "inferior reversion types," required from 3 to 8 generations to acquire the normal rate of growth of the original strain in the minimal media. This is considered to be due either to some form of suppressor or to phenotypic lag.

- 120 HOLTON, C. S.
Pathogenicity studies with inbred lines of physiologic races of *Tilletia caries*.

Phytopathology 1953 : 43 : 398-400.

Using an improved method (cf. *PBA*, Vol. XXI, Abst. 2408), inbred lines of several physiological races of *T. caries* were produced on seven test varieties of wheat by inoculating with compatible pairs of monosporidial lines derived from a single chlamydospore at Pullman, Wash. Inbreds from homozygous races resembled their parents with respect to pathogenicity, whereas those from races heterozygous for pathogenicity showed a wide range of variability. The inadvisability of differentiating races on the basis of their reaction to the same test variety is discussed, with reference to races T-9 and T-10, and races T-4 and T-6; both members of each pair induce identical symptoms on certain hosts, but analyses of inbred lines on several hosts have shown that T-9, T-4 and T-6 are in fact heterozygous. It is pointed out that the pathogenically heterozygous nature of bunt populations in the field is the main factor contributing to the dynamics of specialization in this genus.

- 121 HOLTON, C. S.
Fusion between secondary sporidia in culture as an index of sex compatibility in *Tilletia* species.

Phytopathology 1953 : 43 : 322-23.

Development of a fusion tube between secondary sporidia placed close together on a suitable medium by means of a micromanipulator is considered to be a reliable criterion of compatibility between monosporidial lines of *T. caries*. Reactions between paired sporidia from nine lines in all possible combinations indicate that compatibility is controlled by two factors (cf. *PBA*, Vol. XXI, Abst. 2408). Monosporidial lines of opposite mating type, with respect to fusion between secondary sporidia, were, however, not always compatible with primary

sporidia of opposite mating type. Some unique compatibility relationships reported from matings between secondary and primary sporidia in culture need clarification by inoculation experiments.

- 122 BERLINER, M. D. & OLIVE, L. S.
Meiosis in *Gymnosporangium* and the cytological effects of certain antibiotic substances.
 Science 1953 : 117 : 652-53.

The haploid chromosome number of *G. clavipes* and three other species was found to be $n = 8$. A study was made of the effects of penicillin G, streptomycin and cycloheximide (Actidione) upon the basidia of *G. clavipes*. One of the effects of streptomycin treatment was disturbance in the synchronization between nuclear divisions and cross-wall formation. The most striking effect of cycloheximide was the production of many basidia with two nuclei closely associated, or still connected to each other by chromatic strands, in sharp contrast to the usual long distance between daughter nuclei; possibly this behaviour was due to malfunction or disintegration of the spindle.

- 123 VISCONTI, N.
Genetics of bacteriophage.
 Un. Int. Sci. Biol. 1953 : Sér. B : 180-85.
 A general review of mutation, recombination and linkage in bacteriophages is presented as a basis for the mating theory of phage genetics, already summarized in *PBA*, Vol. XXIII, Abst. 1767.

- 124 ADAMS, M. H.
The genotypically and phenotypically heat resistant forms in the T5 species of bacteriophage.

Un. Int. Sci. Biol. 1953 : Sér. B : 164-74.
 From four phages, T5, PB, 29 α and BG3, characterized by heat susceptibility (*st*⁺), particles resistant to heat were isolated at the rate of 10^{-3} per phage duplication; none of these particles was able to transmit heat resistance to subsequent progenies. T5 also produced a proportion (10^{-7} per phage duplication) of individuals in which a gene mutation to *st*, controlling heat resistance, had occurred; offspring of these mutants inherited the same degree of resistance.

- 125 BRESCH, C.
Genetical studies on bacteriophage T1.

Un. Int. Sci. Biol. 1953 : Sér. B : 157-63.
 Using metachrome yellow and water blue, the following mutants were isolated from phage T1 infecting *Escherichia coli* B: T1c, a small

Diseases, Injuries, Bacteria, Fungi, Viruses *continued*.

plaque with a narrow blue margin; T1c', a small plaque with a slender blue halo; T1w, of the same size as the wild type (*w*⁺) with a broad yellow halo; and T1wz, with a violet halo. Results of recombination analyses of progenies from crosses between different strains supported the genetical data for T2 (cf. *PBA*, Vol. XVIII, Abst. 2109 and Vol. XIX, Abst. 1667). Linkage was detected between *c'*, *w* and *h*, the gene controlling ability to lyse *E. coli* B/1. From a culture containing three strains with the genotypes *c'wh*⁺, *c*⁺*w*⁺*h*⁺ and *c*⁺*wh*, some individuals combining the genes *c'*, *w*⁺ and *h*, each derived from a different parent, were obtained. In terms of the mating theory developed by Visconti and Delbrück (cf. *PBA*, Vol. XXIII, Abst. 1767), recombination of marker genes from the three parents indicates that at least some phage particles paired more than once.

- 126 JESAITIS, M. A. & GOEBEL, W. F.
Mechanism of phage action.
 Nature, Lond. 1953 : 172 : 622-23.

When a highly concentrated suspension of phage T4 was mixed with a solution of the specific lipocarbohydrate of *Shigella sonnei* phase II, a prompt release of the content of the viral membrane took place. Since the lipocarbohydrate is a component of the antigenic complex present on the cell surface of the phase II bacteria, it is suggested that this substance is responsible for initiating the release of genetically active material from the phage when the virus encounters the living host.

- 127 WEIGLE, J. J. & BERTANI, G.
 Variations des bactériophages conditionnées par les bactéries hôtes. (**Variations in bacteriophages caused by the host bacterium**).

Un. Int. Sci. Biol. 1953 : Sér. B : 175-79.
 After giving a summary of recent researches into the power of adaptation of phages to new hosts, the authors suggest that this may be attributed to a biological mechanism in the phage which is necessary in the cycle of reactions essential for the reproduction of the phage and the exact nature of which is conditioned by the host bacterium.

- 128 DE MARS, R. I., LURIA, S. E., FISHER, H. & LEVINTHAL, C.
The production of incomplete bacteriophage particles by the action of proflavine and properties of the incomplete particles.

Un. Int. Sci. Biol. 1953 : Sér. B : 113-28.
 Tailless particles, liberated when *Escherichia coli* B infected with T2, T5 and T6 lyses in the

presence of proflavine, resemble the heads of mature phage but contain 3/4 as much S^{35} in the form of protein and only 1/6 as much P^{32} in the form of nucleic acid when these isotopes are added to the nutrient medium (cf. *PBA*, Vol. XXIII, Abst. 1771).

129 EVANS, E. A. (JUN.)

The origin of the components of the bacteriophage particle.

Un. Int. Sci. Biol. 1953 : Sér. B : 129-42.

Evidence supporting the transference of bacterial deoxyribonucleic acid (DNA) to the progeny of infecting virus particles is reviewed. In view of the apparent nonspecific utilization of purines and pyrimidines of the host and of the parent virus particle, it is possible that varying results obtained from the use of bacteria with different isotopic labels reflected the fact that bacterial purines and pyrimidines may be incorporated at varying rates in viral DNA.

130 GRAHAM, A. F.

The fate of the infecting phage particle.

Un. Int. Sci. Biol. 1953 : Sér. B : 90-98.

Among seven phages of the T series it has been shown that the breakdown of superinfecting virus particles in *Escherichia coli* is confined to systems in which an even-numbered phage penetrates a host already infected with an even-numbered virus or T 5. P^{32} carried by the superinfecting particles is excluded from virus progenies if breakdown occurs (cf. *PBA*, Vol. XXII, Abst. 2497); exclusion was, however, also observed when superinfection was by unrelated phage or when breakdown was suppressed by streptomycin. While it has been suggested that transference of P^{32} may not be associated with transference of hereditary characters, it is probable that the P^{32} of the parent virus is incorporated into the genetic material of the offspring. Thus the mechanism by which P^{32} is excluded may also be responsible for genetic exclusion.

131 HERSHEY, A. D.

Intracellular phases in the reproductive cycle of bacteriophage T2.

Un. Int. Sci. Biol. 1953 : Sér. B : 99-112.

Experimental techniques by which information concerning multiplication of phage within bacteria has been obtained are outlined. Differences between the replication of genetic determinants of the nonmembranous components and membrane are discussed with respect to

the material conservation of parental DNA on the one hand and the exclusion of parental membranes from the host on the other.

132 NICOLLE, P., JUDE, A. & DIVERNEAU, G. Antigènes entravant l'action de certains bactériophages. (**Antigens restricting the activity of certain bacteriophages**).

Un. Int. Sci. Biol. 1953 : Sér. B : 27-50.

Experiments showed that certain antigens protect the bacterium they surround from attack by some strains of phages.

Antigen Vi, which is responsible for the susceptibility of the bacterium to phage Vi, provides a protective layer which the phage CNV cannot penetrate. The same antigen thus fulfils two roles, receptive and protective, depending on the strain of phage involved.

133 WAHL, R.

La semi-résistance aux bactériophages. (Semiresistance to bacteriophages).

Un. Int. Sci. Biol. 1953 : Sér. B : 51-59.

Experiments were carried out with the mutant strain IV, semiresistant to phage S_{13} , of *Shigella paradysenteriae* Y6R. It was found that colonies of strain IV contained both susceptible and resistant individuals, each type itself producing progeny of both types, so that even after the destruction by lysis of susceptible individuals, further bacteria receptive to the phage appear in the progeny of the immune elements.

In comparisons between the semiresistant strain IV and the susceptible strain O of *S. paradysenteriae* it was found that the plaques produced on the colonies of the former tended to be smaller and more irregular than in the case of the latter. The process of infection is much slower, only a small proportion of the bacteria being infected, and no widespread lysis occurs.

CROP PLANTS

134 **Inventory of crop plants grown in Australia.**

Divl Rep. Div. Pl. Ind. Commonwealth Sci. Industr. Res. Organ. Australia 1951 : No. 15 : Pp. 83. (Mimeographed).

An inventory is given of approximately 740 species of economic plants grown on an experimental scale at 54 stations, institutes and other testing centres in Australia, information being included on the availability of viable seed and vegetative propagating material, and on whether several varieties of a species are maintained.

135 **Annual Report (abridged) of the Scottish Plant Breeding Station, Craigs House, Corstorphine, Edinburgh 1953 : Pp. 49.**

Oats. In the trial of 44 selections and 5 control varieties at Corstorphine, Edinburgh, the polyploid Aa A18 (cf. *PBA*, Vol. XXIII, Abst. 975) again gave the highest yields, but its superiority was not significant. Two centres have been established, one in Inverness-shire and the other in Argyle, for selection under local conditions. Hybrids were selected in the Hebrides under conditions of soil alkalinity. In the regional variety trials, Aa A18 showed promise as an early ripening, high yielding oat of the fodder type; Aa 732 and Aa 733 also gave high yields, and may be possible successors of Early Miller and Bell, respectively.

The cross between the induced polyploids of *A. strigosa* (4x) and *A. sativa* (12x) was repeated, but the resulting octoploids were again sterile (cf. *PBA*, Vol. XXIII, Abst. 975).

Barley. The short, stiff-strawed selection Ac 370 was increased; it is especially suitable as a nurse crop for the timothy Scotia. Ac 370 was again distributed for regional trial as a fodder variety, in comparison with the stiff-strawed Scandinavian varieties, under heavy dressings of nitrogen.

Herbage plants. In connexion with the problem of exploiting marginal land and possibly more hill land, genecological investigations are being carried out on species contributing to natural vegetation. Study of the British population of *F. ovina* has revealed the existence of two chromosome races, morphologically indistinguishable in the wild. The results of a replicated trial showed that, although overlap occurs in character measurements, the 4n form is always potentially the larger. The octoploid form of *F. rubra* has been found to be much more widespread within the British Isles than was originally anticipated. Some evidence has already been obtained that such chromosome races may be further divided into environmentally specialized ones. *Euphrasia* spp. have been collected, as they appear to offer suitable material for experiments on factors controlling the distribution of heritable variation in hill-land species.

Breeding is primarily concerned with the production of specialized rather than general-purpose strains. Grasses at various stages of testing include a late-flowering, sweet ryegrass which might be useful for cutting for silage under conditions of very intensive manuring, a vigorous early cocksfoot, and progenies of

crosses between plants of Ayrshire perennial ryegrass, exhibiting little or no late-summer or autumn shooting.

Swede. In a test for winter hardiness, three lines of AFT, a purple-topped type, showed both hardiness and high yield of dry matter per acre. In a trial of eight strains developed at the Station, AFT also showed promise. The results of two trials comparing groups of related lines are also reported. No significant differences could be detected between those units which had been self-fertilized and those seeded in groups. Asiatic brassicas were highly susceptible to club root.

Potato. Three additional strains of *Phytophthora infestans* have been found among isolates from other countries, bringing the number up to 13. The three new strains fall into place in the previously formulated scheme of classification on a genetical basis (cf. *PBA*, Vol. XXIII, Abst. 2048). Several potato strains containing four genes for blight resistance are at the more advanced stages of trial as possible economic types.

The majority of strains of virus X fall into three well-defined groups, characterized by their ability to kill varieties carrying either the gene *Nx* or *Nb*, *Nx* only, or *Nb* only. US seedling 41956 was immune from all strains. Its immunity depends upon two dominant, complementary genes. Together these genes override the effect of *Nx*, but when separated the full necrotic action of *Nx* can be expressed in the presence of an appropriate strain of virus X.

Study of 12 virus Y strains has shown that 9 are variants within a single group, and that the remaining three are distinct from these and each other. The genetics of response to virus Y was investigated in seedling progenies derived from *S. rybinii* (CPC 979), necrosis-reacting seedlings, and seedlings of complex parentage involving *S. brevimucronatum*, *S. jujuyense*, *S. rybinii* (CPC 1311), *S. saltense* and *S. simplicifolium*. Promising field-immune types were found in some progenies. The genes determining necrotic responses to viruses X, A, Y and C in these diploid species are contained within a single linkage group.

In breeding economic types with resistance to virus Y, high yielding seedlings, many of them involving *Solanum simplicifolium* and other wild species, have been produced. The majority of the selections also possess one or more genes for blight resistance, and some are field immune from virus X.

A programme of breeding for resistance to eelworm (*Heterodora rostochiensis*) has been

established. Data from selfed lines of resistant lines of *S. andigenum* from the Commonwealth Potato Collection suggest that eelworm resistance is heritable and can be introduced into commercial varieties in a relatively short time. Many crosses involving resistant lines were made.

Sugar beet. Resistance to bolting is the main aim of improvement. The Cambridge non-bolting strain KNB 178 gave a satisfactory performance.

Kales. Leafier forms are aimed at. Kohlrabi varieties were crossed with thousand-headed kale; curly kale and a large-leaved form of broccoli were also used as parents. Attempts to combine kale and turnip continued. Asiatic *Brassica* species were studied.

In hybrid kale trials, two F_1 hybrids, ASX' and ASX'', derived from two unrelated plants, one from the strain AMK of thousand-headed kale x broccoli and the other from a perpetual x curly kale strain, gave the highest yields of leaf, but produced more stem than thousand-headed kale. Two samples of inbred AMK showed a high ratio of leaf to stem but were low yielding; restoration of vigour will be attempted by intercrossing with unrelated strains.

Davey, V. E. McM. *The domestication of Brassica.* (pp. 40-43).

The genomic constitution of different groups of *Brassica* spp. is discussed in relation to the possibility of securing valuable new forms for cultivation. At the Scottish Plant Breeding Station, preliminary studies of the Asiatic species *B. pekinensis*, *B. chinensis* and *B. japonica* have been carried out, to discover characters which might profitably be introduced into European brassicas. All three species are apparently highly susceptible to clubroot; they are also liable to rapid bolting, if conditions are not exactly suitable for their vegetative development. On the other hand, none of the varieties has formed inedible woody stems, and some of the samples of *B. chinensis*, particularly the Shantung type, have given heavy yields of leafage.

Cockerham, G. & McGhee, T. M. R. *Potato stunt disease.* (pp. 37-40).

Differences shown by potato varieties in response to infection by a virus designated potato stunt are described.

136 Thirty-third Report and Accounts of the National Institute of Agricultural Botany 1952 : Pp. 44.

The chief results are given of varietal trials of

wheat, oats, barley, maize, lucerne, forage and sugar beet, potato, linseed, field pea and bean, and vegetables. On the basis of the tests the Cereal Trials Advisory Committee decided that the wheats Hybrid 46, Staring and Cappelle Desprez should replace the varieties Vilmorin 27, Nord Desprez and Wilhelmina respectively on the Recommended List. Pilot wheat is to be retained in the Provisional List for a further period. Proctor spring barley gave high yields. The following strains of sugar beet were recommended: Battles E, Bush, Cannells, Gartons C, Goldsmith's Dobrovica, Hilleshög E and N, Sharpes Klein E and Webbs 2 (cf. Abst. 519). Tests were held of the susceptibility of cereal varieties to yellow rust and loose smut. The wheat varieties Staring, Hybrid 46, Hybride de Lobeau, Glasnevin Rosa and Ministre [Minister] proved fairly resistant to yellow rust.

137 Growers' notes and station record of the Gulval Experimental Station, Bristol 1949-1950 : Pp. 46. (Mimeographed).

Data are presented on broccoli and cabbage varieties cultivated in Cornwall, and their comparative suitability for this area.

Early potatoes. A survey is given of the main characteristics of the various varieties under cultivation, and the need of new varieties combining early cropping qualities with other essential characteristics is emphasized. Home Guard is the preferable variety for the present, but is not suitable for soils with a lime-induced manganese deficiency.

Roscoff Broccoli. Varietal selection work is reported. Outstanding selections were Gulval 48/21 and 48/22.

138 GULJAEV, G. (At the Petrovskaja State Breeding Station).

Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 5 : 57-59. [Russian].

Wheat. A new wheat Petrovskaja 7, which yields 3.5-7.5 c. grain more per ha. than other winter standards in the Penza province, and is interesting for its earliness, winter hardiness and resistance to drought and lodging, is described.

Brome. A productive and hardy variety of *Bromus inermis*, Penza 1, has been obtained by mass selection of local material. It shows resistance to drought and yields 48.2 c. hay per ha.

Potato. New varieties, Promyšlennyy [Industrial], with a higher starch content than Lorh or Wohltmann, Udarnik [Shock Worker], which

yields 30 c. tubers more per ha. than Lorh, has early maturity and shows resistance to wart, and Hybrid 42, a mid-season type carrying resistance to *Phytophthora*, wart and common scab have been developed. The last named variety was derived from crosses involving several domestic varieties and a wild Mexican form.

Lentil. Penza 14 yields 2-3 c. more seed per ha. than Petrovskaja 4/105, previously bred at the institute. It shows resistance to drought, lodging and *Fusarium* and produces large green seed. Petrovskaja Zelenozernaja [Petrovskaja Green-seeded] has reached the advanced trial stage. It produces indehiscent pods and shows resistance to *Fusarium*.

139 SALAMOV, A.
(Breeding research at the North Osetian State Breeding Station).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 2 : 19-24.
[Russian].

Wheat. New winter wheats bred in recent years include Jubileinaja Osetii [Osetia Jubilee], Osetian 3 and Osetian 4, which are interesting for their productiveness and resistance to lodging and rust. They were selected from the F_8 of Koveil x Vencedor. Mention is made of a promising early variety, Erythrospermum 897, still under trial.

Maize. Some productive, early varieties have been obtained by selection of North Caucasian maizes. Gorec Rannii [Early Mountaineer], derived from Osetinskaja Belaja Zubovidnaja [Osetian White Dent], shows resistance to drought and is earlier than Gorskaja Želtaja Kremnistaja [Mountain Yellow Flint] and more productive than the standards. In some hybrids, for instance Mestnaja Belaja Kremnistaja [Local White Flint] x Sterling, heterosis has been maintained by selection in later generations. Reference is made to the productive single crosses 666 and 676 and a double cross VIR*37, which have recently been released. They yield 47-50 c. kernels per ha.

Timothy. A productive variety, Osetian 1, obtained by intervarietal open pollination, is mentioned.

Red clover. An early clover, Osetian, noted for its high yield, has been bred by intervarietal open pollination.

Phaseolus. The promising lines, 302/45 and 119/45, which outyield the standard Belaja Gorohovidnaja [White Pea-like] and show resistance to diseases, have been selected from some local populations.

Soya bean. Line 19, which is 40 days earlier and has a 6% higher yield than the standard Harbin 231a, has been selected. Its pods grow 2 cm. higher above the ground than those of the standard.

140 VOROPAEV, A. A.
(The grain quality of some promising Siberian varieties).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : 24-27.
[Russian].

Wheat. Many spring wheats, bred for good baking properties in recent years at various breeding institutes in Siberia, are briefly described. Of these Albidum 3700 and Tulun 197 produce grain of equal quality to that of Caesium 111, and Milturum 2078 is interesting for its earliness.

Rye. Onohoiskaja, Belgačevskaja, Sibniizhoz† 1 and a large-grained variety Tulunskaja Zelenozernaja [Tulun Green-grained], noted for their good baking properties, have been developed recently in Siberia.

Millet. The new Siberian varieties, Beskarağskoe 716, Semipalatinsk 158, Hybrid 40 and Novosibirsk 236, producing better quality grain than Komsomolec [Komsomol], are mentioned.

Peas. Promising new varieties grown for their seed include 84, 108, Hybrid I-II-47 and Sretenskii 1. The two latter were selected from Urožainyi [Productive] on the basis of cooking quality.

Oil plants. The new sunflowers 19, 150 and 201, which have a higher oil content than Pioneer Sibiri [Siberian Pioneer], were obtained by vegetative hybridization at Omsk. Promising Siberian-bred varieties of *Camelina*, oil poppy and linseed are mentioned.

141 ‡ Årsberättelse över Sveriges Utsädesförenings verksamhet år 1952. (Annual report on the work of the Swedish Seed Association for the year 1952).
Sverig. Utsädesfören. Tidskr. 1953 : 63 : 83-160.

During 1952, 18 new varieties and strains were released, including the following: the autumn

* Vsesojuznyi Institut Rastenievodstva [USSR Institute of Plant Industry].

† Sibirskii Naučno-Issledovatel'skii Institut Zernovogo Hozjaistva [Siberian Scientific Research Institute of Grain Farming].

‡ An extended summary of this paper is on file at the Bureau.

wheat U 01395, a sister variety of Odin, which it surpasses in protein content, yield and baking quality, but not in strength of straw; the spring rye 0101 (Petkus spring rye x a land variety from Od in Västergötland); the high-yielding field pea, U 05801 (Hero x Artturi), with a relatively low 1000 corn weight; the fodder vetch U 02261, obtained by selection from a Polish vetch, high yielding with a low yield of foliage and thus specially suitable for seed production; the high-yielding meadow fescue Sv 01206 derived from a plant found at Lakvik in Östergötland; Sv 02010, a new brome grass surpassing Prior (cf. *PBA*, Vol. XXII, Abst. 2764) in yield and having seed more suited for machine sowing; the turnip M 025, a mixture of three tetraploid strains; the winter turnip rape Sv 0104, from the hardy Polish Wilensis and Lembke's turnip rape, and exceeding Rapido and Lembke's in yield and oil content; and the spring turnip rape 0306, bred from a Tabor strain (Czechoslovakia) x Mettes strain 0300, and outyielding Gute (cf. *PBA*, Vol. XXII, Abst. 4922).

The work of the Association at Svalöf included:

Autumn wheat. The highest yielding selections in the southern Swedish collection comprised 01460b (Atle x Åring I), which was the only rust resistant winter wheat last year.

The best commercial varieties were Trifolium 14 and Mendel II, with Hansa and Skandia IIIB as next best.

Oats. A combination of high yield and quality with stiff straw is the main aim in breeding. The new early Probsteier type, Blixt [Lightning], gave the best yield.

Rye. Collaboration between Svalöf and the five southern Swedish branch stations was continued in research on the autumn variety Dubbelstålråg [Double Steel], a tetraploid variety (cf. *PBA*, Vol. XXIII, Abst. 2624).

At Ugerup, spring rye breeding was continued with special emphasis on hybridization between Petkus and a land variety from Od. Intensive work on crosses between spring and autumn rye was begun.

Barley. Work on 2-rowed barley included trials of Ymer and Bonus élites and closely related lines, some newer material of the malting and fodder types, and a large number of X-ray mutants.

The strongest straw in combination with the best resistance to breaking when ripe for combine harvesting was recorded for Sv 50/102 (Morgenrot x Ymer C), Herta and Rika.

At Hjerupslund, the mutant *erectoides* 32 yielded 5070 kg. of grain per ha. as compared

with 4920 kg. for Bonus, which it also surpassed in strength of straw. The most productive 6-rowed barley was Sv 49/520 (a Moroccan barley x Edda).

Lines from Edda x Bore, i.e. spring 6-rowed x autumn barley, proved a great advance as regards strength of straw.

Forage plants. The field peas U 05661 (Solo x Hero) and U 05181 (from Hyringa) were the most productive. The new Remmendal vetch, Stjärnvicker [Star], formerly called Vg. 02051, outyielded Svalöfs Förädlade Sötvicker [Svalöf Improved Sweet vetch] by about 25-27%.

Testing of early mutant lupins obtained by X irradiation was continued. New élites free from alkaloids were raised and the causes of deterioration in this respect were investigated. The tetraploid strains outyielded the diploids in red clover and in Alsike clover experiments.

Red clover crosses have been made to obtain strains of the Silo clover type, but earlier flowering and with a more abundant aftergrowth.

Hybrids, obtained from crosses between the blue lucerne du Puits and lines with a very high set of seed, have been planted.

The lucerne Sv 0618, the timothy strain Sv 0836, with its remarkably good aftergrowth, and the white clover Sv 0414 are mentioned for their productivity.

Root crops. Tetraploid strains of turnips gave a considerably higher yield than the ordinary diploid strains.

Potato. Further work on the production of virus-free strains and of *Phytophthora* resistant varieties from breeding material comprising *Solanum demissum* was carried out in collaboration with the National Phytopathological Institute.

Flax. Margareta and several other new varieties of flax exceeded Herkules in yield of straw, fibre and seed.

Hemp. Breeding is concentrated on the production of monocious strains with the highest possible total output of fibre. Crosses have been made between diecious Italian, Baden and Bredemann hems on the one hand, and monocious Schurig hemp on the other.

Tobacco. Yield trials were carried out with lines from crosses between Swedish and American tobacco, and selection of material from new crosses, including back crosses between the best new lines and the parent varieties, was undertaken.

Hops. New material of Belgian hops for use in hybridization was planted. Crosses were made between strain 85 and closely related types

to obtain earlier, higher-yielding strains, richer in resins.

Oil crops. Breeding followed the same lines as in 1951. Trials of varieties of rape, white mustard and *Camelina* were carried out.

Kok saghyz. About 900 plants were retained for crossing and the production of new seed. In spite of lower than normal temperatures during the vegetation period, rubber content was the highest recorded so far.

Cytogenetic research

The Chromosome Division carried out experiments on the production of polyploids of red clover, turnips, Alsike clover (especially material from northern Sweden), sugar mangels, sugar beets, fodder carrots, oats, species of *Festuca* and *Lolium*, and northern Swedish varieties of autumn rye.

Triploid turnips could not be bred on a large scale for practical use owing to sterility between diploids and tetraploids.

In connexion with seed control of tetraploids, research was begun on the behaviour of tetraploid rye in the vicinity of and in mixtures with the diploid (cf. *PBA*, Vol. XXIII, Abst. 2624). Similar studies of Alsike and red clover and of turnips were begun.

Hybridization of a tetraploid cabbage with a tetraploid turnip gave some plants resembling *Brassica napus*, some of which had a swollen root.

Experiments on polyploid timothy were extended to include estimations of the vitality of races with different chromosome numbers under varying geographical and edaphic conditions.

Other studies concerned: the determination of the position of the translocation point in the idiogram of barley mutants; the effect of certain chlorophyll mutations in conjunction with different types of heterozygosis in polyploid Gulkorn [Golden barley]; and meiosis in the F_1 generation from crosses between black and white oats.

Work on the control of mutation and its possible application in plant breeding continued.

Mutants of practical value and surpassing the parent line in yield—and in some cases in other points too—include: a long-strawed mutant of the barley Bonus and a short-strawed one of Maja; mutants of the autumn wheat Skandia III and of Klockhavre II [Bell oat II]; four lines from the oat Same; and early forms of yellow sweet lupin and white mustard. Preparatory experiments on the treatment of soya beans, potatoes and *Poa pratensis* with radioactive isotopes have been begun.

Institute for Genetic Research

By colchicine treatment of hybrids between rye-wheat and rye, types of rye-wheat with 42 wheat and 28 rye chromosomes were obtained. Dubbelstål proved superior to tetraploid Kungsråg [King's rye] and tetraploid Petkus. Considerable increases in yield were obtained from intercrossing various tetraploid ryes. The incidence and effect of the accessory chromosomes that occur in different diploid varieties of rye were studied and similar work on meadow fescue is in progress. Comparative inbreeding experiments with diploid and tetraploid rye were undertaken.

Research on polyploidization of barley was continued.

Detailed reports from the various branch and substations of the Seed Association are appended.

- 142 Lijst van proeven en proefbedrijven van rijkslandbouwconsulenten en andere instanties 1953. (**List of tests and experimental farms of national agricultural advisors and other authorities, 1953**).

Meded. LandbVoorlDienst, Den Haag 1953 : No. 68 : Pp. 103.

The tabular data composing this report (cf. *PBA*, Vol. XXIII, Abst. 2473) include a 4-page list of new varieties of bread cereals, rape, maize, peas, beans, flax, linseed, poppy and potatoes undergoing field trials in the Netherlands in 1953 and not included in the list of approved varieties for the year.

- 143 CHAMBERS, P. C.
Annual Report of the Department of Agriculture, Cyprus, for the year 1952 (1953) : Pp. 16.

Wheat. Observations on the resistance of introduced and local varieties and of hybrid selections to *Puccinia graminis*, *P. triticina* and *P. glumarum* were continued.

Tobacco. Selection is in progress at the Tobacco Trial Station, Akradhes.

Onion. Crosses of local with improved varieties are under test.

- 144 **Quarterly Review of the Department of Agriculture, Cyprus, 1953 : No. 32 : Pp. 31. (Mimeographed).**

A progress report is presented on cereal, tobacco and other crops under cultivation. A number of forage varieties were introduced from abroad, and particulars of their performance under Cyprus conditions are given.

Maturation period and resistance to disease of wheat and oat varieties are listed. Among the wheats, only the Mexican variety Yaqui proved completely immune to all three types of rust occurring in Cyprus. Of the oats, the varieties Cherokee, Roxton cc 3870 and Red Rustproof proved best under local conditions.

145 First Annual Report (1952 crop season) of the Central Rainlands Research Station (Tozi Research Farm). Sect. 5. Plant introduction and breeding.

Min. Agric., Sudan 16-36. (Mimeographed).

Sorghum. The results of a trial of 25 varieties show that the immediate demand for combine sorghum can be met by introductions from the United States. Local varieties have, however, outyielded the American introductions; selection of the former for suitable types has accordingly been extended. Seed of crosses of the stiff-stemmed dwarf variety Shantung Kaoliang with Combine 60 and White Martin was obtained from Nebraska. This Chinese parent is highly resistant to lodging, and has a thicker and more heavily lignified hypodermis than the African sorghums.

Sesame. Three local types differ in their photoperiodic behaviour. A segregating population originally obtained from the United States, and containing a gene for capsule indehiscence, derived from a Venezuelan type, was again raised. All indehiscent lines were poor yielders, with low capsule numbers and small capsules; some also had too long a maturation period for the Sudan. By back-crossing, an attempt is to be made to introduce the gene for indehiscence into Early Resistant White, a variety combining high yield and resistance to the bacterial disease *marad ed dam*. A further increase in yield may be obtained by using American introductions as parents. Although photoperiodically unadapted, they have a high capsule number per unit length of stem; in addition, N 1020-2-7-B has 8 locules per capsule, and K 10 3 capsules per leaf axil.

Sunflower. Data were obtained suggesting that Giant Russian, a very mixed variety, contains a heritable element for self fertilization.

Groundnut. A classification of the varietal collection at the station is given.

Other crops. Observations were made on varieties of the following: maize, *Pennisetum typhoides*, *Setaria italica*, velvet bean, cowpea, *Dolichos lablab*, cotton, castor bean, *Guizotia*

abyssinica, *Hibiscus esculentus* for oil, and several pulses.

146 Rapport du Conseil de l'Expérimentation et des Recherches agronomiques pour 1950-1951. (Report of the Council of Agronomic Experimentation and Research for 1950-51).

Alger 1951 : Pp. 212.

In addition to trials of varieties of sugar beet, sweet sorghum and cotton, raised from seed imported from Europe and America, the following work was carried out at various research stations in Algeria.

Wheat. Efforts are being made to breed early hard wheats that will ripen in time to escape the effects of drought, scorch and hot winds. The following hybrids are promising: Zénati x Bouteille; Bouteille x Hedba; (Syndioux x Mahmoudi) x (Zénati x Bouteille); and selections of Palestine J 5.

Some durreloid wheats from the back cross of *Aegilops* 14.257 x Florence Aurore 8.193 proved fairly early and will be subjected to genetic analysis.

Oats. The most promising of the six varieties tested for yield were the black oat 912 and selection 8, which is suited to the southern districts of Algeria. Cowra x 912 no. 1828 is a promising forage type and resistant to lodging.

Maize. The most promising early and late strains of American hybrids on the basis of their first year's test are listed.

Barley. The native barley S-8-E (Deloye) did well at Sidi-Bel-Abbès and is undergoing selection to repurify the type. Among the imported varieties, M 38 from Palestine and O-C 89 from Montpellier are of interest, the former as an early, leafy forage type, and the latter as a high-yielding variety.

A study of the varied progeny of the malting barley hybrids US 43 x Colmar, Moravia x 0.48, US 43 x 0.48 and others has shown the 2-rowed barleys or their hybrids to be susceptible to *Helminthosporium* and prone to lodging. Only 3.517 (US 43 x Colmar) will be multiplied.

Forage legumes. Trials of lucerne and *Vicia sativa* comprised mainly imported varieties from the USA, Europe, Syria and Morocco.

Tobacco. A world collection of species and varieties is being built up at the Isserville Station, where selection of lines of native types is in progress. At the Barral Station, American and oriental tobaccos, and a cross between the Hungarian variety Tizzaner and White Burley 41 A are being studied in addition to 22 local or imported varieties of *Nicotiana rustica*.

Vine. Systematic research on vines, begun in 1950, included investigations by the Viti-cultural Laboratory of the Agricultural Institute of Algeria on the calcium tolerance of stocks; clonal selection of varieties for dessert grapes and for wine making; and the suitability of hybrid producers for various stocks.

Lentils. In addition to trials of mass selected strains of large yellow and small white lentils, including varieties from Chile, a study is being made of large green forms probably derived from a natural hybrid between the large yellow and the green type of Algeria. In the hope of increasing the diameter of the seeds, selections from the green strain 64 T have been made on the basis of diameter, intensity of coloration and markings of the seed.

147 Rapport annuel pour l'exercice 1950. (Annual report for the financial year 1950).

Publ. Inst. Nat. Agron. Congo Belge 1951 : Hors Sér. Pp. 392.

The following crops are dealt with in this report (cf. *PBA*, Vol. XXII, Abst. 2542).

Pyrethrum. Two polyploid clones at the Mulungu-Tshibinda Station contained less than 1% of pyrethrin: one of them, Co 53, showed an increase in the diameter of the pollen. The seedling offspring of both clones retained some of the vegetative vigour of the parents.

There may be a positive correlation between number of flowers and resistance to *Ramularia bellunensis*.

The correlation between the morphological characteristics of the inflorescences and the pyrethrin content is being investigated.

Maize. The maize collection at Yangambi comprises varieties from the USA and the Congo. Lines of white maize have been crossed with Turumbu de Bokao.

At the Gandajika Station, work on the production of the double hybrid 391 x 351 (Gandajika amélioré [Gandajika Improved]) and of pure lines by selfing was continued. In single crosses Hickory King and Pride of Saline combined better with the synthetic population No. 1 (GPS. I) than with Gandajika amélioré.

Elongation of the sheath occurs frequently in maize in the Gandajika region. It is easily eliminated in selfed lines although a true-breeding line without it has not yet been obtained.

Millet. At the Gandajika Station, local populations of *Pennisetum typhoides* are undergoing selection for earliness, shape of panicle and 1000 grain weight.

Sorghum. At the Kiyaka Experimental Station, out of 25 varieties, the best yield was obtained from Urusongi II, which gave 25% more seed than the control Mbirizi, which produced 2414 kg. per ha. in valley soil at Kiyaka.

Rice. At the Yangambi Research Centre, in addition to pedigree selection and the study of hybrid progenies, research is proceeding on variation in the length of the spikelet in line Rz III/I, and on the vitreousness of the kernel in relation to its position in the panicle.

Coix lacryma-jobi. At Yangambi, four élite lines were selected on the basis of seed weight, protein content and husk percentage.

Sweet potato. At the Mulungu-Tshibinda Experimental Station, seedlings from out-crosses and controlled pollinations are under observation.

Cotton. At the Bambesa Experimental Station, hybrids retained for observation include (1) F_4 and F_5 generations from back crosses of Stoneville 5, and (2) several lines from crosses of Stoneville 2 x DP/12/12.

In wilt-resistance investigations back crosses of Stoneville O/4 x Gar 32 and of Stoneville O/4 x DPL II/A/1 to Stoneville O/4 have been carried out.

Flowering, the causes of shedding, climatic effects and the influence of the position of the floral bud on the development of the plant and lint quality are being studied.

At the Gandajika Experimental Station, 1335 lines are now undergoing pedigree selection and 18 of the more promising hybrid lines from crosses between wild cottons and Upland are listed to show their yields of lint and seed, ginning outturn and wilt resistance.

Back crosses were effected of wild x Upland hybrids to the Upland parent and of (1103-1104 x M 97) to M 97.

Cassava. At Yangambi, 100 hybrids are being raised. Among 48 indigenous and foreign clones introduced, six from the Yangambi region have shown great resistance to mosaic.

Selection for yield, root weight, protein and water content, toxicity and resistance to lodging is proceeding.

Dioscorea. The biology of flowering is being studied.

Coffee. At the Mulungu Regional Laboratory, the search for varieties of *Coffea arabica* resistant to *Antestia bechuana* was continued.

The hybrids at the Yangambi Research Centre include Congusta crosses and F_2 plants from Arabica x Robusta under conditions of uncontrolled pollination.

Studies of progenies for yield, type of bean and quality of the market product are in progress. Interspecific and intraspecific hybrids are under observation.

A technique for fermenting small amounts of coffee has proved satisfactory.

Cacao. At Yangambi, the biology of the plant and its adaptation to conditions in the Congo are being investigated. In the search for hardy types suitable to poor soils, 92 individuals have been selected after examination of 12,000 trees. The breeding plots comprise progenies from (1) uncontrolled pollinations of Forastero mother trees and of criolloid mother trees, and (2) controlled pollinations of criolloid mother trees.

Aleurites. At the Mulungu-Tshibinda Station, the collection now includes *A. fordii*, *A. montana* and *A. moluccana*. Preliminary studies of breeding material are proceeding.

Sunflower. Early plants with single flowers were selected at the Gandajika Station from the varieties Tshiabobo and Huilco-Elizabethville.

Oil palm. The Yangambi Research Centre made a study of the chemical constitution and absorption spectra of different species and botanical varieties of *Elaeis* to ascertain their possible effect upon oil quality if they were included in the breeding material.

The breeding programme includes an analysis of the inheritance of the *albescens* character in crosses of *albo-nigrescens* and *albo-virescens*.

The study of *E. melanococca* involved 141 interspecific and intraspecific crosses.

Cinchona. The choice of mother trees for clonal selection is proceeding in conjunction with chemical tests at Mulungu and Tshibinda. Breeding material includes, in addition to progenies from uncontrolled pollinations, a large quantity of hybrid seed from artificial pollinations, representing 12 different crosses.

Hevea. At Yangambi, comparative trials and preselection tests for yield and quality have been carried out. The performance of various clones as estimated by the Testatex method has also been recorded and the correlations between determinations of vigour in early tapping and the Testatex tests were studied.

Seedlings CT 88, M 5 and Tj 3 have proved exceptionally early in coming into bearing.

Wind-resistance tests of Tj 1 and the resistant clones BD 5, Av 49 and Av 152 were carried out.

Mulberry. Experiments at the Sericultural Research Centre at Mont Hawa had shown the superiority of the varieties Romain and Moretti for raising silk worms.

Groundnut. Experiments with a pink strain A 20 and a red strain A 65 at the Food Plants Research Centre, Yangambi, showed that 0.5% of natural crossing occurred.

Mother plant selection from natural and artificial hybrids is being carried out.

Phaseolus and other legumes. Yield trials at the Nioka station included varieties of *Ph. vulgaris*, *Ph. angularis* and *Ph. lunatus*, which is highly resistant to drought. Analysis of *Ph. coccineus* showed that this species contained 2.2% of lipids as compared with 1.4% for the other species. Populations of *Ph. angularis*, *Ph. mungo* and *Ph. aureus* are being tested in acclimatization plots.

At Yangambi, an experiment on natural crossing between a yellow-seeded soya bean E 36 and the green-seeded E 42 showed 3% crossing for E 36 x E 42 and 6% for the reciprocal.

Selection of promising breeding material from 11 indigenous varieties of *Vigna sinensis* has been continued.

148 Annual Report of the Department of Agriculture, Colony and Protectorate of Kenya 1952 : Pp. 66. (Mimeographed).

Particulars are given of cereal, grassland, pyrethrum, potato, cotton, sisal, tobacco, tea and coffee cultivation and breeding.

Wheat. A new physiological form of black stem rust, K 12, to which most wheat varieties cultivated in Kenya appear susceptible, has been identified.

A new wheat variety, R 64, a selection from a cross between Ceres 721 and the Canadian hard red spring wheat DC., has been released. It is resistant to all 12 forms of black stem rust. A large number of new introductions combining high yield and quality with rust resistance are undergoing tests.

Maize. The work of breeding locally adapted hybrids continued. Experience has shown that imported hybrids are unlikely to be successful in Kenya.

Barley. The Scandinavian varieties Kenia and Ymer are to be released shortly. Further introductions from abroad are undergoing tests.

Sugar. In the Miwani Kibos area, the variety Co. 421 proved superior to the standard variety Co. 281. Variety trials of other Coimbatore canes are in progress.

Sunflower. Work continued with the selection and bulking of the three dwarf varieties Klein, Southern Cross and Mennonite. The Canadian variety Sunrise proved to be a true dwarf form

and bulking of this variety for further tests was undertaken.

- 149 RATTRAY, A. G. H.
Agricultural Experiment Station,
Salisbury. Annual report of experi-
ments, season 1951-52.
Rhod. Agric. J. 1953 : 50 : 195-212.

Data are presented on wheat, sorghum and safflower cultivation.

Maize. Severe attacks of *Helminthosporium turcicum* led to attempts to breed strains resistant to this disease.

The yields of various double hybrid strains of maize were compared, together with lodging resistance and other particulars.

Potatoes. The variety Up-to-Date continues to be superior in yield and keeping quality in Rhodesia.

- 150 Progress Report of the Dominion
Experimental Station, Kapuskasing,
Ontario 1941-1951 (1953) : Pp. 86.

The results are given of variety trials of hybrid maize, millet, timothy, lucerne, clovers, mangels, swedes, turnips, beans and peas.

Other cereals. Data are given on yield, number of days to maturity and resistance to lodging of the cereal varieties tested. Regent 975.1, Rival and Cascade gave the highest yields among spring wheats and Byng, Galore and Montcalm among barleys. Of the oat varieties, Beacon, Fortune, Andrew and Shelby produced the best yields and showed good resistance to lodging.

- 151 Progress Report of the Dominion
Experimental Station, Ste-Anne-de-
la-Pocatière, 1946-1951 (1953) : Pp. 72.

The results of variety trials of maize for silage, oats for pasture, swedes, soya beans for seed, and timothy are given.

Spring wheats. Special attention was given to developing rust-resistant varieties. Data are given on yield, number of days to maturity, length of straw, resistance to lodging, bushel weight and 1000 kernel weight of the varieties tested. Acadia and Cascade gave the highest yields.

Buckwheat. The varieties best adapted to local conditions are Silver Hull and Japanese B and O for human consumption, and Red Stem Grave I for fodder purposes.

Oats. Data are given on yield, number of days to maturity, length of straw and percentage hull of the varieties tested. Over the period 1940-1950 Roxton, Ajax and Erban gave the highest yields and are recommended by the

station. From 1946 to 1951 Abegweit 51 out-yielded all other varieties. The variety Clinton proved outstanding for strong straw.

Barley. Moncalm was superior in yield. An unnamed strain, Ottawa 2550 A, shows considerable promise.

Lucerne. The results of variety trials are given. The main objectives in breeding are the development of hardier varieties, increased yield, greater persistency under grazing conditions, tolerance of acid soils and the discovery of creeping-rooted types agronomically adapted to the area.

Clover. Results of 10 years' trials have shown the superiority of improved varieties such as Dollard, Ottawa, Late MC and Altaswede over commercial red clover.

In breeding ladino clover, greater hardiness and increased seed setting were the main objectives. Data on factors found to increase seed production, and on methods of breeding used, are given. **Mangel.** The variety Prince gave the greatest yield of green matter, and the variety Tip Top of dry matter.

Fibre flax. Over an 8-year period, Stormont Cirrus was superior in fibre and tow production, whilst Liral Dominion gave the highest yield of seed. For the period, 1947-50, a new selection, L26, and Liral Prince proved superior in yield and quality respectively.

Field bean. In tests conducted on sandy soils, the varieties Burbank, Grainer and Navy produced roughly equal yields.

Field pea. The new variety Valley gave a higher yield than any other variety tested.

- 152 Report of the Minister of Agriculture
for Canada for the year ended March
31, 1953 : Pp. 143.

Data are presented on cereal, fibre, forage and vegetable and fruit crops.

Wheat. Hybrid combinations are being tested in the hope of finding a new type of sawfly resistance, different from that of Chinook and Marquis.

At the Winnipeg laboratory for cereal breeding, priority is being given to attempts to produce a wheat variety resistant to race 15B of stem rust. Synthetic species are being produced by colchicine treatment of F_1 hybrids of *Aegilops* and *Agropyron* with *Triticum*. Some amphidiploids introduced from England have shown a high degree of resistance to race 15B.

The most promising resistant variety produced is however the hybrid CT 186, a selection from the cross (McMurachy x Exchange) x Redman, with three successive back crosses to Redman. This hybrid has given a high yield, is resistant

to lodging, stem rust and bunt, and comparatively resistant to leaf rust and loose smut.

Progress has been made in the breeding of varieties of soft winter wheat resistant to rust and loose smut. Breeding for resistance to bunt and dwarf bunt is in progress.

Oats. At the Winnipeg cereal breeding laboratory, a selection from the variety Garry that is resistant to Victoria blight, all stem rust races, both smuts and a number of races of crown rust has outyielded the original Garry, which was susceptible to Victoria blight, in trials over a three-year period.

A new race of stem rust, designated 7A, was found in the new variety RL 2123, hitherto highly resistant to all races of the disease.

Barley. In the western provinces the appearance of new races of loose smut complicated the breeding of rust-resistant varieties. There is evidence that rye stem rust is attacking barley more than hitherto, and that varieties resistant to wheat stem rust are susceptible to the rye rusts.

Progress is reported in selecting varieties and hybrids resistant to *Helminthosporium sativum*. F₄ selections from the cross Rabat x Vantage appear promising.

Tobacco. New varieties now under test have a high degree of resistance to *Thielaviopsis basicola*.

Linseed. Research on the inheritance of reaction to rust and pasmo indicates that rust reaction is inherited simply, but that pasmo infection is either governed by multiple factors or else a number of races are involved.

Apples. The selection 0-2016, from the cross McIntosh x Milwaukee, has been recommended for extended trial as a late winter apple. This selection is hardy and has a vigorous growth. The fruit possesses good keeping qualities.

Pears. Two new Ottawa pear varieties, Miney, a selection from the cross Zuckerbirn [Sugar pear] x Clapp Favourite seedling, and Phileson, a Kurskaya [Kursk] x Flemish Beauty seedling, are described.

Tomatoes. The selection Geneva T-5 continues to show a high degree of resistance to *Phytophthora infestans*. Experiments designed to transfer the resistance genes of Geneva T-5 to commercially valuable varieties are in progress.

153 **Report for 1947 and 1948 of the Ontario Horticultural Experiment Station** : Pp. 82.

Plum. Most of the seedlings from Imperial Espineuse x Italian Prune lacked vigour. Seedlings from Imperial Espineuse x President

were generally vigorous, but inferior in fruit quality compared with the few seedlings from the first-named cross.

Cherry. Breeding during the period 1915-48 is surveyed.

Grape. Detailed information is given on breeding carried out on table and wine grapes from 1913 to 1948.

Asparagus. V-35, a selection of Mary Washington, has given good results in experimental and commercial plantings (cf. *PBA*, Vol. XX, Abst. 660).

Cucumber. Bacterial-wilt resistant selections from the United States have been crossed with Marketer and Straight 8; back-cross and self pollinations are being made.

Tomato. The leaf-mould resistant selection V-4804 gave promising results.

The production of F₁ hybrids for processing, early marketing, or greenhouse cultivation is under way.

The resistance of *Lycopersicon hirsutum* and *L. pimpinellifolium* to *Septoria lycopersici* is being transferred to commercial tomatoes.

Sweet corn. The varieties Vinegold and Vinecross B 5 have been introduced. Vinegold is especially suitable for canning, and is ready for picking just before Golden Cross Bantam. Vinecross B 5 is recommended for freezing and the domestic garden; both its parents were developed from Golden Bantam.

Selfing and back-crossing are being carried out to produce a series of improved inbreds with maturity dates ranging from very early to very late. Genetic markers, such as purple midrib, are being incorporated in these inbreds, to simplify seed production.

154 **Rapport du Ministre de l'Agriculture de la Province de Québec pour l'année finissant le 31 mars 1951. (Report of the Minister of Agriculture of the Province of Quebec for the year ending 31 March 1951).**
Québec 1951 : Pp. 155.

Maize. Laval, a new early maize of good quality with longer ears than Spancross, has been bred.

Selection for earliness is in progress from crosses between the very early flint maize from the Gaspésie district and several common sweet varieties.

Herbage grasses. At the Agricultural Institute of Oka a study of polymorphism in *Calamagrostis* has been undertaken.

Vine. Selection and breeding to obtain a sufficiently hardy commercial variety is proceeding.

Tomato. At the Deschambault Breeding Station, seed of the new varieties Québec 5 and Québec 13 was released. The latter variety has larger fruits than the former, but ripens 3-4 days later.

- 155 Rapport du Ministre de l'Agriculture de la Province de Québec pour l'année finissant le 31 mars 1952. (**Report of the Minister of Agriculture of the Province of Quebec for the year ending 31 March 1952**). Québec 1952 : Pp. 180.

Maize. Efforts are being made to obtain from populations of the variety Laval very early types of suitable size for marketing.

Tobacco. Breeding for earliness is the main objective.

Rhubarb. At the Macdonald College, experiments have shown the variety Macdonald to be the best as regards quality, while Balentine is the highest yielding.

Tomato. The new varieties Québec 5 and 13 can be stored for several days without deterioration. Crosses have been made to obtain a large-fruited variety as early as Québec 5.

- 156 **Progress Report of the Kentville, N.S. Experimental Station for the years 1947 to 1951 (1953)** : Pp. 89.

Trials of leguminous, root and other vegetables were conducted, together with tests of the comparative suitability of a number of fruit and vegetable varieties for canning and freezing purposes.

Progress in the breeding of currants, gooseberries, blueberries, cranberries and elderberries is reported.

Apple. The main objectives of the breeding programme have been to obtain a high quality late-keeping variety suited to Nova Scotia and also to produce varieties resistant to apple scab. Naturally occurring tetraploid trees have been used extensively in the breeding programme, and a search was made for colour sports.

Pear. New promising commercial varieties are Russett Bartlett, Beierschmitt, Ewart and Cayuga. Characteristics of the main varieties on test at the Experimental Station in 1951 are tabulated.

Plum. The most promising of the newer varieties are June Blood, Becky Smith, Early Laxton, California Blue, Clyman, Santa Rosa, Maynard, Mallard, Michelson, Street, Reeves, Victoria, Maglis, Yakima and Albion. Seventy-five varieties, as well as three numbered selections, are undergoing trial in the test orchard.

The salient characteristics such as yield, date of ripening, and dessert and canning quality are given for the more outstanding varieties.

Peach. Fifty-one varieties and three numbered selections are on test. The following combine productiveness and moderate tree hardiness with size, quality and attractiveness of fruit: Mari-gold, Oriole, Golden Jubilee, Vedette and Veteran. Of newer introductions under test the following are the most promising: Jersey-land, Dixigem and Triogem.

Raspberry. Newburg and Viking were superior to other varieties tested.

Strawberry. Twenty-four varieties are under test, and 42 varieties have been tested in the five years under review.

Senator Dunlap, Premier and Pathfinder are recommended as early to midseason varieties, Catskill as midseason, Sparkle a midseason to late and Louise as a late-season variety. The average yields of these varieties over a five-year period are given.

Tomato. The object of the breeding programme is to develop new strains which will mature early and produce high quality fruit. A small tomato from Guatemala, *Lycopersicon esculentum* var. *cerasiforme*, is to be used in crosses with cultivated varieties in an attempt to incorporate the former's blight resistance into the latter.

- 157 Memoria del Ministerio de Agricultura e Industrias, Costa Rica, 1951. (**Report of the Ministry of Agriculture and Industry, Costa Rica, 1951**). 1952 : Pp. 280.

The work reported includes the production of seed of improved maize and coffee varieties and variety trials with potatoes, rice, wheat, lucerne, sugar cane, tobacco, cotton, sorghum and various other crops.

Maize. The tests included observations on 93 hybrids obtained by crossing pure lines from the varieties I-451 and I-452 with the varieties themselves. All the hybrids were inferior to the original varieties; the Mexican Rocamex 520c however exceeded them by over 50% in yield.

Observations were made on the behaviour of 91 maize varieties comprising part of the bank of genes organized internationally by the countries of South America. A collection of local Costa Rican varieties was also established, and observations are being made on their yielding ability, resistance to lodging, *Diabrotica* and other insects.

158 **Administration Report of the Director of Agriculture, Colony of Trinidad and Tobago. 1951 : Pp. 47.**

Information is presented on the work of the Department of Agriculture for 1951, and data included on sugar cane and swamp rice variety trials. The latter trials included introductions from abroad.

159 **Golden Anniversary Convention held in New Orleans, Louisiana, February 9, 10, 11.**

Proc. Ass. Sth. Agric. Wkrs. 1953 : Pp. 215.

Coleman, O. H. *The inheritance of resistance to stalk red rot in sorghum.* (p. 40).

Progeny analyses have been carried out on a cross made at Meridian, Miss., between Sart, a white-seeded sweet sorghum with resistance to red rot and leaf anthracnose (cf. *PBA*, Vol. XXII, Abst. 1304), and Rex, a brown-seeded variety susceptible to both diseases. Segregation ratios for reaction to *Colletotrichum graminicolum* in the F_2 and F_3 show that the factor for red rot resistance, designated *C*, is inherited as a simple dominant. *C* is closely linked with *L*, the factor determining resistance to leaf anthracnose, but *C* and *L* are both independent of *Rr*, the factors for seed colour.

Sandal, P. C. *Association of characters and variation within a number of space planted F_4 lines of Lespedeza stipulacea.* (p. 41).

Variation in time of flowering, plant size and seed yield was analysed at Fayetteville, Ark., in the F_4 of lines obtained by crossing late-maturing strains of Climax with two early-maturing varieties, Rowan and FC 31757. Coefficients of variability for these characters within each line and wide differences between lines indicated that selection would be effective. A significant negative correlation ($r = -.2061$) was found between flowering date and seed yield; seed yield showed a highly significant and positive correlation ($r = +.4868$) with plant size; and a significant positive correlation ($r = +.2231$) was found between date of flowering and plant size. Thus successful selection for intermediate maturity combined with vigorous growth and high seed yield is predicted.

Crowder, L. V. *Hybrid progeny of tall and meadow fescue and rye grass.* (pp. 41-42).

Although seed was set in crosses involving tall and meadow fescue and annual and perennial

rye grass in all possible combinations at the Georgia Agricultural Experiment Station, most caryopses collapsed after 10 days. Some apparently normal seedlings were, however, obtained by culturing excised embryos. Germination and seedling development varied with different crosses, indicating the influence of the genotype. The intergeneric progenies derived from tall fescue ($2n=28$) were the only ones which bore inflorescences; these resembled panicles rather than spikes. Panicles of the interspecific *Festuca* hybrids were indistinguishable from those of their parents.

Meiotic studies of the F_1 of tall fescue crossed with meadow fescue ($2n=14$) and the rye grasses ($2n=14$) showed that the 28 somatic chromosomes formed 2-14 bivalents with varying numbers of univalents and multivalents at metaphase; bridges and fragmentation at anaphase resulted in microspores with micronuclei. Many anthers failed to dehisce, owing to degeneration of tapetal and sporogenous tissues, and all pollen was nonviable. Male-sterile hybrids were, however, back-crossed to *Festuca* and *Lolium*; seed was set but no seedlings survived.

Eckhardt, R. C. *A technic to simultaneously incorporate male sterile cytoplasm and restorer factor(s) into inbred lines of maize.* (p. 42).

At the Agricultural Experiment Station, State College, Miss., genes restoring fertility have been added to nonrestoring inbreds by the following technique. A fertile F_1 , carrying male-sterile cytoplasm, is obtained from a cross between a cytoplasmically male-sterile line and the line carrying genes for restoring fertility. This F_1 hybrid is pollinated by the inbred that is to acquire genes capable of restoring fertility. Fertile offspring are used as the female parents in back crosses, with the inbred as the recurrent parent. After adequate back-crossing, fertile segregants are selfed and a fertile homozygote is selected; this constitutes an inbred line carrying factors for restoring fertility. Sterile segregants can be crossed again with the inbred to produce a male-sterile inbred line.

Grassl, C. O. *Cold-induced male sterility in sugarcane at Canal Point, Florida.* (pp. 42-43).

Over a period of three years, the effect of night temperatures on anther dehiscence has been studied in more than 100 selections. Dehiscence was suppressed in most clones by night temperatures of 60° F or less for a short period. A few clones shed pollen after exposure to 50° F or less.

Weybrew, J. A., Mann, T. J. & Monroe, R. J. *Certain comparisons between flue cured varieties of N. tabacum and their hybrids with N. sylvestris.* (p. 43).

At Raleigh, NC, 11 hybrids between *Nicotiana sylvestris* and flue-cured varieties of *N. tabacum* flowered 10 days earlier than their respective *N. tabacum* parents. The hybrids were characterized by fewer leaves and a lower average content of reducing sugars and total alkaloids than the flue-cured varieties. Nicotine comprised 83% of the alkaloids in the parent varieties, but the predominant alkaloid in the hybrids was nornicotine.

Self, F. W. & Henderson, M. T. *Inheritance of strength in a cross between AHA 6-1-4 and Half and Half cotton varieties.* (p. 44).

Estimates of the number of genes controlling fibre strength, measured in Pressley units, have been made from the F_2 of Half and Half x AHA 6-1-4 at the Louisiana Agricultural Experiment Station, Baton Rouge. Calculations using the Castle-Wright formula have shown that 4-5 gene pairs are involved. The number of individuals with the AHA genotype, in respect of fibre strength, recovered in the F_3 also supported this estimate. The correlation between fibre strength of F_2 plants and the mean strength of F_3 lines grown from them was 0.762, with a regression of 0.526 for the F_3 , indicating that selection in the F_2 should effectively secure lines with high fibre strength in the F_3 and subsequent generations.

Hebert, L. P. & Matherne, R. J. *An analysis of results of field tests of important sugarcane varieties during recent years.* (pp. 44-45).

Methods of conducting trials of sugar cane in Louisiana are discussed. Data from trials during the 1943-51 period show that trials over several years are desirable for reliable evaluation. Particular reference is made to the consistently high yields produced by CP 44/101, included in trials from 1949 to 1951.

Burton, G. W. *Significant advances in crops research in the South.* (p. 56).

The importance of cooperative research for the improvement of crop varieties is outlined in a popular manner.

Ostrom, C. E. *Recent developments in the Southern Forest Tree Improvement Program.* (pp. 115-16).

Activities contributing to the coordination of research in forest genetics since 1950 are reviewed. They include the organization of a

survey of geographic variability in southern pine, with respect to the relation between seed source and plantation performance.

Kehr, A. E., Yu Chen Ting & Miller, J. C. *Induction of flowering in the Jersey type sweet potato.* (p. 128).

Orange Little Stem, a Jersey variety which seldom blooms in the USA, was used for hybridization with moist-fleshed varieties after being induced to flower at Baton Rouge, La., by grafting on stocks of two species, *Ipomoea rubra* and *I. carnea*. The fact that neither species has storage roots is considered significant with respect to the accumulation of reserve carbohydrates above ground and development of inflorescences.

Yu Chen Ting & Kehr, A. E. *Cytologic studies of the meiotic divisions in the sweet potato (Ipomoea batatas Lam.).* (pp. 128-29).

Meiotic configurations at metaphase I are characterized by secondary association of bivalents ($2n = 90$), indicating that the sweet potato may be of recent allopolyploid origin, combining genomes of a tetraploid and a diploid. The low percentage seed set by L 9-32 is correlated with the occurrence of lagging chromosomes at metaphase I and II, and the appearance of 18-24 univalents; enough functional pollen is produced, however, for this variety to be used as a pollinator.

Barham, W. S. *The inheritance of a bitter principle in cucumbers.* (p. 129).

The bitter flavour of PEI 173889, a cucumber resistant to downy and powdery mildews, is controlled by a single dominant gene. Preliminary investigations at the North Carolina State College indicate that the gene for bitterness is not linked closely, if at all, with the factors for mildew resistance.

Mohr, H. C. *A mutant leaf form in water-melon.* (pp. 129-30).

An analysis of segregation for lobed and nonlobed leaves in selfed progeny of a nonlobed mutant of Black Diamond, maintained at College Station, Texas, and in F_1 and F_2 progenies of Black Diamond x the nonlobed mutant, has shown that genes for lobing are incompletely dominant.

Johnstone, F. E. (Jun.). *The results of two years root unit selection of sweet potatoes to maintain cork-free stock in Georgia.* (p. 130).

Selection for freedom from internal cork in lines of the Porto Rico type at the University of Georgia has resulted in little difference

between selected lines and controls when conditions are favourable for development of cork. Internal cork has increased more rapidly in originally disease-free lines of Georgia Bunch Porto Rico than in Unit 1 Porto Rico over two seasons.

Kehr, A. E. Morphological structure of the surface layers of the sweet potato with relationship to skin injury. (p. 131).

No correlation has been found between skin thickness and susceptibility to bruising during harvest of the varieties Unit 1 Porto Rico, L-240 and L-241 at Baton Rouge, La.

Hernandez, T., Mikell, J. J., Dallyn, S. L. & Miller, J. C. Specific gravity relationships of sweet potatoes. (pp. 131-32).

Considerable variation in specific gravity occurred in individual hills of Unit 1 Porto Rico at the Louisiana Agricultural Experiment Station; roots with high specific gravity had a low content of total sugars. In Pelican Processor, high specific gravity was correlated with high starch percentage. All varieties with high specific gravity also had a large dry matter content.

Greenleaf, W. H. Tobacco-mosaic resistant pimiento peppers. (p. 132).

Promising results have been obtained at Auburn, Ala., in a programme of back-crossing hybrids from Holmes' bell pepper x an inbred pimiento line to the pimiento parent, followed by selfing. The progeny combine good fruit type and size with a capacity for localization of strains of tobacco mosaic virus. This protection from systemic infection is determined by LL, inherited from Holmes' bell pepper.

Ivanoff, S. S. A simple method for testing rind resiliency as a shipping quality in watermelon fruits. (pp. 132-33).

The method in use at the Mississippi Agricultural Experiment Station for evaluating the hardness and resilience of the rind, by attempting to bend a thin strip into a circle, is described. Selections with rinds which bend 180° before snapping will transport well.

Alben, A. O., Sitton, B. G., Dodge, F. N. & Harris, O. W. Comparative growth and yield of Stuart, Success and Schley pecan varieties. (p. 142).

Although Stuart trees were larger than Success or Schley after 18 years, at Shreveport, La., the highest yields were given by Success. Both Success and Schley came into bearing earlier than Stuart.

Feazell, G. D. Reaction of sweet potato varieties and seedlings to internal cork disease. (pp. 154-55).

Differential reactions were shown by commercial varieties and unnamed seedling selections core-grafted with infected tissue from susceptible Porto Rico at the Louisiana State University. The resistance of 9-18, 9-65, 9-65A and L-224 was promising.

Dean, J. L. & Struble, F. B. Resistance and susceptibility to root-knot nematodes in tomato and sweet potato. (pp. 156-57).

Root systems of *Lycopersicon peruvianum* and its resistant derivatives were invaded by fewer larvae than susceptible *Lycopersicon* spp. at Stillwater, Okla. Resistant host tissues became necrotic soon after invasion and the larvae died subsequently. Similar necrosis was noted in resistant sweet potatoes, but the number of larvae entering the roots of susceptible and resistant varieties was comparable.

Martin, W. J. Reaction of the Deltapine 15 variety of cotton to different isolates of Meloidogyne. (p. 158).

Deltapine 15 grown at Baton Rouge, La., proved resistant to 13 of the 40 isolates of root knot nematode collected from different parts of Louisiana.

Neal, D. C. Fusarium wilt resistance and fiber properties of some new cotton hybrids and selections. (p. 159).

On plots infested with wilt and nematode at Baton Rouge, La., the following hybrids with satisfactory lint percentage and staple length have shown promising resistance: Louisiana 33, Louisiana 3314, Deltapine 6-8-5 x Delfos 6102 and (Deltapine 6-8-5 x Delfos 6102) x Deltapine 6-8-5. Louisiana 33 is being grown commercially in northwest Louisiana.

Apple, J. L. & Lucas, G. B. Effectiveness of various field inoculation procedures in testing tobacco for black shank resistance. (p. 160).

Results of tests for reaction to *Phytophthora parasitica* var. *nicotianae* at Raleigh, NC, indicate that stem inoculations are not practical for large-scale field tests with present breeding stocks. Root inoculation with cultures grown on sterilized oat grains proved most effective in separating moderately and highly resistant lines, particularly if carried out when transplanting in moist soil at about 68° F.

Hare, W. W. A new race of Fusarium wilt of cowpea. (pp. 161-62).

Most of the isolates collected from different

parts of Mississippi were classified as races 1 or 2 according to their effect on appropriate test varieties (cf. *PBA*, Vol. XX, Abst. 1993). However, certain isolates considered as race 2 induced more damage than other race 2 isolates on several varieties and killed Arlington, a variety normally resistant. It is suggested that such isolates be designated race 3.

Lehman, S. G. Race 4 of the soybean downy mildew fungus Peronospora manshurica. (p. 162).

Another physiological race, designated race 4, which fails to infect soya beans used to differentiate races 1, 2 and 3 of *P. manshurica* has been obtained from Roanoke in North Carolina (cf. *PBA*, Vol. XXI, Abst. 745). It causes severe symptoms on Rokunsun and N 48-1867, while Acadian and Woods Yellow are mildly affected.

Cooper, W. E. Variation in the pathogenicity of Sclerotium rolfsii Sacc. isolates on peanuts. (p. 163).

The relative pathogenicity of 26 isolates showing considerable variability was consistent during 1950 and 1951 in groundnut plots at Raleigh, NC. Three of five isolates causing severe symptoms in 1951 remained strongly pathogenic in 1952, but the pathogenicity of two was reduced.

Abbott, E. V. Evidence for the occurrence of a hitherto unrecognized growth-retarding disease of sugarcane in Louisiana. (p. 164).

A full account has already been summarized (cf. *PBA*, Vol. XXIII, Abst. 2102).

Earhart, R. W. Culm rot, another Helminthosporium disease of oats in Florida. (pp. 164-65).

Oat lines with resistance to culm rot (*Helminthosporium sativum*) have been selected for inclusion in the breeding programme at Gainesville, Fla.

Futrell, M. C. The influence of greenhouse temperatures on the development of Erysiphe graminis tritici on wheat seedlings. (p. 165).

The influence of temperature on the response of 15 spring wheats to powdery mildew was investigated at Madison, Wis. All susceptible varieties showed maximum infection at 20° C. Hope responded more to temperature than other varieties, being moderately susceptible at 24°, but resistant at 16 and 20° C. Khapli, *Triticum timopheevi* and hybrids CI 12632 and CI 12633, derived from the latter, proved resistant at all temperatures.

Owen, C. R. A new variety of white clover developed from Louisiana stocks. (p. 202).

Breeding methods used at the Louisiana Agricultural Experiment Station to develop the synthetic variety Louisiana S-1 are outlined (cf. *PBA*, Vol. XXII, Abst. 1223).

Gibson, P. B. & Schultz, E. F. (Jun.). Environment and the number of vascular bundles per petiole in white clover. (pp. 202-03).

Another version has been summarized (cf. *PBA*, Vol. XXIII, Abst. 2760).

160 **37th Annual Proceedings of the Ohio Vegetable and Potato Growers Association 1952 : Pp. 189.**

Lettuce. Variety tests demonstrated that Premier Great Lakes, Pennlake, Progress and Imperial 44 remain superior to other varieties grown in this area.

Tomatoes. Of the early varieties Stokesdale, Valiant and Pritchard, and of the later varieties Marglobe and Rutgers, are recommended. Among the comparatively new varieties, Queen and Longred were superior.

Sweet corn. Recent variety tests indicate that North Star, Marcross and Carmelcross are still the superior early varieties, and that Golden Cross Bantam, Golden Security, Victory Golden and Ioana are the best midseason to late varieties.

Of varieties tested specifically for processing suitability Victory Golden, Tendermost and Ioana combined high yields with superior processing qualities.

161 **What's new in farm science. Annual Report of the University of Wisconsin 1952 : Bull. No. 498 : Pt. 2 : Pp. 73.**

The results of breeding experiments and particulars of a number of hybrids of various crops which are in the process of development are given.

Pepper. A new variety, Wisconsin Lakes, developed from Asgrow King, is described. It produces a high yield, and does well under conditions often unfavourable for fruit setting in other varieties. The dark green peppers are mild, medium to large and have a thick flesh.

Onion. Of hybrid onions available commercially, the variety Autumn Spice gave the best results in tests conducted in 1951.

Cabbage. A new variety of early cabbage, Badger Market, selected from a cross between Globe and Racine Market, is described. It possesses a small round head that does not burst and is resistant to yellows.

162 **Annual Report of the Director of Agriculture, British Guiana, for the year 1952** : Pp. 49. (Mimeographed).

Data are presented on cotton, jute, manila hemp and other crops.

Rice. Single crossing, back crossing and bulk selection techniques are being employed to produce an erect, non-shattering variety. The local strain 79, crossed with various USA and Venezuelan varieties, is producing useful progeny.

Sugar cane. The breeding policy is to produce varieties which are high yielding and suitable for local conditions as well as resistant to leaf scald disease. The results are given of variety tests of resistance to the disease. Some of the newer Demerara and Barbados strains have shown tolerance or resistance, and the suitability of these from other aspects is being investigated by putting them into estate trials.

Soya bean. The varieties Ringgit and Mamotan gave the highest yields.

163 **Jaarverslag over 1950. Departement van Landbouw, Veeteelt en Visserij, Suriname. (Annual report for 1950. Department of Agriculture, Livestock Rearing and Fisheries, Surinam)** : Pp. 87.

Maize. Seed of the variety Maja ripened in 90–105 days and lacked uniformity, many ears resembling the variety Gele Oost-Java. A selection of various types was therefore chosen for sowing. Cuban Flint and Hastings Prolific, both from Florida, were planted as well as the varieties Calamba, Boman, Gele Oost-Java and Gele Menado, received from the Buitenzorg Research Station. Some of their characteristics are briefly mentioned.

Rice. Families raised from hybrid populations from seed from Nickerie were subjected to selection for long, coarse, straight grains and stiff straw. Ultimately 245 plants chosen for type of grain and length of panicle were retained for line selection.

About 900 plants of the variety Skrivimankoti and 600 of the variety Holland with over 20 stems each were also kept for line selection.

Observation plots of varieties from Portugal, the USA, Surinam and Java indicated that, with the spacing used, the Indonesian varieties were generally superior to the imported rices in yield. The Portuguese varieties were not suitable to the climate.

Three trials were laid out to compare the better known varieties in cultivation as regards yield,

length of vegetation period and other characteristics. The varieties D 52/37 and Mas equalled Skrivimankoti in yield, but the first named lodged a good deal. Mas ripened in 148 days, as compared with 178 for D 52/37, and showed little tendency to lodge.

Other cereals. Preliminary tests of American sorghums and of some rather heterogeneous *Pennisetum typhoideum* material are in progress. The latter comprised some plants with 43 and 34 ears per plant. Progenies from the four best plants were sown separately and have shown good drought resistance.

Ramie. Plants raised from an American clone received via the Netherlands showed inferior growth. The four Javanese clones in the older plantation did well.

Sugar cane. A severe epidemic of *Diatraea canella* is attributed to the replacement of POJ 2878 in some plantations by the more susceptible clone B 37161.

Cacao. In selecting material for breeding work, trees reported never to have suffered from witches' broom disease were retained as possible mother trees.

Work on the diagnostic characteristics of clones was carried on and provisional descriptions of the main clones were formulated, though the great variability in young trees caused difficulty in deciding the authenticity of some clones.

Oil palm. Seed of *Elaeis melanococca* from Surinam is being studied at Wageningen and in London. In exchange the Surinam Station has received seed from various *dura* x *tenera* crosses of *E. guineensis* for research.

Tung. The possibility of introducing this crop into Surinam is being investigated, and plants have been raised from seed (a) of eight selected clones of *Aleurites montana* from the Buitenzorg Experimental Station, and (b) obtained from Gainesville Experimental Station, Florida, USA.

Groundnut. As the first step in a groundnut breeding programme, line selection of selected plants of the Javanese varieties Schwarz 21 [Black 21] and Gadjah was begun. Both varieties comprised aberrant forms, e.g. plants with very small pods and others with three seeds per pod. In the production of élite seed too, the lines of Schwarz 21 exhibited differences in shape and colour of leaf and in the presence of anthocyanin in the stems; one line flowered four days before the rest.

A small plot of the variety Matjan, one of whose parents is Schwarz 21, was raised from two seeds brought to the station by Mastenbroek. Matjan equals Schwarz 21 in yield but has larger seeds.

Soya bean. Line selection of 25 plants of the white soya bean Ringgit and the black variety 27 was begun. Considerable differences in vegetation period were noted.

Observation plots of the varieties from Buitenzorg, Lawoe, strain 29, Soembing and Manchuria, were laid out. Lawoe seems to consist of an early-maturing type with short stems and a later type with longer stems. Strain 29 produced a number of green and white seeds, which suggests possible adulteration, but, in Java, this mixture has already been found to be an apparently inherent characteristic of the variety.

- 164 VOELCKER, O. J.
Annual Report of the Department of Agriculture, Federation of Malaya, for the year 1952 : Pp. 74. (Mimeographed).

Rice. Variety trials and selection are reported. Further crosses were effected. Seed of four crosses between *indica* and *japonica* types was received from Cuttack, India, in connexion with the hybridization scheme of the International Rice Commission (cf. *PBA*, Vol. XXI, Abst. 1050). Selection of the hybrids is now in progress. Using the Bentall bench huller, data have been obtained indicating that intra-varietal selections may differ by as much as 20% breakage. The equipment is only regarded as effective for distinguishing varieties or selections differing by not less than 10 to 15% breakage.

Clover. Selection plots of introduced clovers were maintained at Cameron Highlands.

Sweet potato. The varietal collection is being reselected for strains giving a high yield of "tops" for pig feeding.

Cacao. In the clonal trial of local Trinitario selections planted in 1949, the early-bearing seedlings S 68 gave the highest yield of pods. Some of the introduced Trinitario seedlings appear to be very vigorous. The results of several experiments suggest that local Criollo cacao is less vigorous than Trinitario or Amelonado. Recent introductions of Upper Amazon cacao and *Herrania* spp. have been successfully established. Fermentation and drying tests show that even the best local Trinitario is yielding very poor pods compared with imported Trinitario and Amelonado.

Oil palm. Data were again secured suggesting that the progeny of the dumpy palm E 206 is the highest yielding (cf. *PBA*, Vol. XXIII, Abst. 583). Selected dumpy palms have been

pollinated by *pisifera* pollen from Nigeria. A nursery of Deli x *pisifera* seedlings has been successfully established at Serdang.

Pineapple. Selection of the varieties Singapore Spanish and Sarawak is in progress.

Soya bean. Final selections of Indonesian varieties have been made; they are now to undergo field trials at Serdang and Kuala Lumpur.

- 165 **Fourth Annual Report of the Commonwealth Scientific and Industrial Research Organization, Australia, for the year ending 30th June, 1952** (1952) : Pp. 173.

In addition to the work referred to below, the results are given of adaptability trials of plants introduced into Australia from Africa and the Mediterranean area, and the behaviour is described of varieties of pasture, fodder crop and green manure species introduced from abroad. Data on experiments involving photoperiodic responses of various plants are also presented. **Wheat.** In variety trials at Kojonup, the superiority of Gabo and Wongoodny among the early varieties and of Eureka and Yalta among the midseason varieties was confirmed.

Oats. Of five varieties tested at Kojonup for grazing recovery, Orient proved superior.

Forage crops. The genetics of resistance to legume viruses in *Pisum sativum* and *Trifolium subterraneum* was studied. Colchicine was used to double the chromosome number of twelve varieties of *T. subterraneum*.

Data on variety trials of forage grasses and clovers at a number of different centres are given.

Potato. Hybrids have been developed combining resistance to potato viruses X and Y, and to late blight, whilst not sacrificing high yield. Their tuber quality was, however, inferior. Other hybrids possessing good tuber type and resistance to viruses X and Y and to leaf roll have also been obtained. By suitable intercrossing it is hoped to produce potato types combining all these characteristics.

A study of the reactions of the resistant hybrids to virus infection indicates that resistance is due to the presence of virus-inactivating systems in the plant concerned.

Tobacco. The effect is being studied of colchicine-induced polyploidy on the leaf thickness of two varieties of thin-leaved tobacco from northern Queensland.

Apple. Experiments in gas storage were conducted with seven apple varieties in 5%

CO₂ at 33° and 36°. The variety Democrat reacted best, showing improvement in flavour and decrease in rot. Trials on the effect of different varieties of rootstock on the storage quality of apples were also held.

Tomato. The variety Rey de los Tempranos [King of the Earlies], resistant to spotted wilt, is being used in crosses with hybrids possessing eelworm and *Fusarium* wilt resistance.

166 The agricultural research service.
London 1953 : Pp. 54.

A survey is given of the history and activities of the agricultural research institutes and units financed by the state under the supervision of the Agricultural Research Council in Great Britain. It refers to several institutes where breeding and cytological investigations are in progress.

167 El cerebro de la agricultura venezolana. (The brain of Venezuelan agriculture).
Agricultor Venezolano 1953 : 18 : No. 161 : 4-15.

A general review is given of the organization of agricultural research in Venezuela, with special reference to the National Institute of Agriculture at Maracay. Brief mention is made of breeding projects.

168 VAN LEEUWEN, J. C.
Assinsel-Congres 3-5 Juli 1953 te Deauville. **(The Assinsel Congress, 3-5 July 1953 at Deauville).**
Meded. Ned. Alg. Keuringsdienst Landbouwszaden Aardappelpootgoed 1953 : 10 : p. 37.

This report of the proceedings of the Congress of the International Association of Plant Breeders for the Protection of New Varieties [Assinsel] deals mainly with the international aspects of legislation to protect plant breeders' rights of ownership.

169 JACQUARD, P.
Mutations provoquées et amélioration des plantes. **(Induced mutations and plant breeding).**
CR Congr. Cinquantenaire Éc. Colon. Agric. Tunis 1950 : 1 : 1-8.

The methods applied and the results obtained in various countries by the use of induced mutations in plant breeding are reviewed. This technique has now been adopted by the Botanical and Agronomic Service of Tunisia in its work on the improvement of cereal crops (cf. *PBA*, Vol. XXIII, Abst. 1796).

170 Växtförädlingen. (Plant breeding).
Lantmannen, Stockholm 1953 : 37 : p. 778.

Attention is drawn to the theoretical interest and the potential value for practical plant breeding of research on the induction of mutation by irradiation with X rays, neutrons and radioactive isotopes (cf. *PBA*, Vol. XXIII, Abst. 167).

171 OLJŠANSKIĬ, M. A.
(Breeding).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 2 : 3-13. [Russian].

A Mičurinite survey of the history of plant breeding and selection is given. It has been written for inclusion in the forthcoming third edition of the Soviet Agricultural Encyclopedia and gives greatest prominence to the agrobiological dicta of Lysenko and Mičurin, though brief references are made to some British, French and American plant breeders of the nineteenth century.

Some of the best varieties of wheat, sunflower and sugar beet, developed in recent years in the USSR, are mentioned.

172 WILLIAMS, J. H.
Differential varietal response of root tissues to exogenous growth regulators in soybeans, oats and corn.
Agron. J. 1953 : 45 : 293-97.

In laboratory tests of the root response of seedlings of many soya bean varieties, oat varieties and inbreds of maize, differential reaction to 2,4-D, 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), isopropyl N-phenylcarbamate (IPC) and naphthalene acetic acid (NAA) was found among the varieties of all three crops. In the case of each crop, high positive correlations were obtained for varietal response to 2,4-D, 2,4,5-T and NAA; the response of a variety to IPC showed negative or low correlations with its reactions to the other three chemicals.

173 Distribución de material fitotécnico por la División de Exploraciones e Introducción de Plantas. (Distribution of plant breeding material by the Division of Exploration and Plant Introduction).
Idia 1953 : No. 61 : p. 12.

A list is given of the experimental stations in Argentina which have undertaken to maintain collections of living material of species and genera of agricultural importance.

- 174 Primera Asamblea Latinoamericana de Fitoparasitología. (First Latin-American Congress of Phytoparasitology). Foll. Misc. Sec. Agric. Ganad. Ofic. Estud. Espec. México DF, 1951 : No. 4 : Pp. 426.

The meeting was organized jointly by the Secretaría de Agricultura y Ganadería de México [Mexican Secretariat for Agriculture and Livestock] and the Rockefeller Foundation and took place in Mexico City on 25 Sept.-6 Oct. 1950. The report contains the following items concerned with plant breeding.

Murillo Peralta, G. *Resistencia del maíz al Fusarium moniliforme Sheld.* (Resistance of maize to *F. moniliforme* Sheld). (pp. 52-57).

Observations were made on reaction to *F. moniliforme*, *Gibberella zeae*, *Diplodia zeae* and *Nigrospora oryzae*, and a number of lines were selected as being resistant; others were selected after inoculation of the stems with *F. moniliforme*.

Orjuela N., J. *Las royas del trigo en Colombia.* (Wheat rusts in Colombia). (pp. 61-70).

Over 1000 varieties or lines have been examined for their reaction to *Puccinia glumarum*, *P. graminis* and *P. rubigo-vera*, and those that proved resistant are tabulated. Several varieties are mentioned as possessing combined resistance to all three rust species. The physiological races concerned are not known except for *P. graminis*, in which races 48 and 15 have been identified.

Campos T., A. *Líneas y variedades Mexicanas de trigo y su resistencia a la roya del tallo.* (Mexican lines and varieties of wheat and their resistance to stem rust). (pp. 70-81).

Studies of the reaction of 190 wheat hybrids to the main physiological races of *Puccinia graminis* var. *tritici* in Mexico, namely races 11, 15B, 17, 38 and 56, showed 20 of them to be resistant to all five; of these 20 varieties, 19 were hybrids of Kenya and tend to lose their resistance at high temperatures.

Robles G., L. *Reacción de las variedades de trigo a Puccinia triticultura Erikss. en Monterrey, Nuevo León.* (Reaction of wheat varieties to *P. triticultura Erikss.* at Monterrey, N.L.). (pp. 81-88).

Tests of 25 wheat varieties and hybrids at Monterrey, Mexico, showed 11 of them to be

resistant to *P. triticultura*, the highest yields being obtained from the resistant varieties Gabo, Chapingo 48 and the hybrid (Mentana x Kenya) x Mentana.

Robles G., L. *Variedades de cebada maltera resistentes al Erysiphe graminis DC. y Helminthosporium gramineum (R.) Erikss. en Monterrey, Nuevo León, México.* [Varieties of malting barley resistant to *E. graminis* DC. and *H. gramineum* (R.) Erikss. at Monterrey, N.L., Mexico]. (p. 89).

Out of 49 varieties tested, only Bolivia was resistant to mildew and on account of its low yielding ability it is being crossed with other barleys. The variety Oderbrucker proved highly resistant to *H. gramineum*.

Tabular data are given showing the yields of the barley varieties tested.

Meléndez, M. de los A. *Resistencia y susceptibilidad de las variedades mexicanas de frijol a la antracnosis, Colletotrichum lindemuthianum (Sacc. y Magn.) Bri. y Cav.* [Resistance and susceptibility of Mexican varieties of bean to anthracnose (*C. lindemuthianum* (Sacc. and Magn.) Bri. and Cav.)]. (p. 118).

Mexican varieties of *Phaseolus* proved susceptible to the prevalent α strain but resistant to the β and γ strains.

CEREALS

- 175 STRAND, E.
Aktuelt fra kornforsøkene foran våronna 1953. (Topical information from grain trials before spring labour, 1953).
Samvirke 1953 : 48 : 118-22.

In addition to Norwegian, Swedish and Finnish varieties of oats, barley and spring wheat, Scandinavian and Dutch varieties of peas are discussed from the standpoint of their cultivation value and their suitability for Norwegian conditions. Details are given of earliness, stiffness of straw, yield, quality and the district to which the particular variety is adapted.

The black oat Nidar II is mentioned as extremely early but its grain quality and yield are not very satisfactory.

The new 2-rowed barley Domen, bred at the Møystad Experimental Farm and put on the market in 1952, resembles Herta in most

respects, but has stiffer straw. Jadar II is the most resistant of the 6-rowed barleys to bad weather and may replace Asplund with advantage.

The new spring wheat, Norrøna, is 3 days earlier than Ås II, which it equals in yield and strength of straw; but it is prone to shed and, in spite of its earliness, shows a very high percentage of germination in the ear (cf. Abst. 216).

- 176 LAUMONT, P. & ERROUX, J.
Quelles variétés de céréales devez-vous semer? (**Which varieties of cereals should you sow?**).

Rev. Agric. Afr. N. Pp. 12.

Algerian growers are provided with a list of recommended varieties of soft and hard wheats, barley and oats, with notes and tables showing their origin, characteristics and suitability for different regions of Algeria.

- 177 SUNESON, C. A.
Frost-induced natural crossing in barley, and a corollary on stem rust persistence.

Agron. J. 1953 : 45 : 388-89.

Examples of emasculation through frost resulting in the facilitation of natural crossing are discussed. It is suggested that emasculation plays a significant role in the evolution of heterogeneous populations.

- 178 LUONG DINH CUA
Chromosome pairings in some autotetraploid cereals.

Seiken Jiho/Rep. Kihara Inst. Biol. Res. 1952 : No. 5 : 54-57.

Investigations were carried out on meiosis in colchicine-induced autotetraploids of *Aegilops uniaristata*, *T. aegilopoides* and *Secale cereale*. The frequencies of microsporocytes with quadrivalents were 81.08%, 92.63% and 89.62%, respectively, the corresponding average number of quadrivalents per cell being 1.54, 2.40 and 2.06. At anaphase I irregular numerical distributions of the chromosomes were observed.

- 179 LUONG DINH CUA
(Meiosis in some artificially induced tetraploids of *Triticum*).

Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : 224-25. (Abst.). [Japanese].

Notes are given on meiosis, in particular multivalent frequency, in tetraploid strains of five wheat species, five species of *Aegilops* and rye.

- 180 HÄNSEL, H.
Vernalisation of winter rye by negative temperatures and the influence of vernalisation upon the lamina length of the first and second leaf in winter rye, spring barley, and winter barley.

Ann. Bot., Lond. 1953 : 17 : 417-32.

Data are presented on the range of temperatures used for vernalization of Petkus winter rye at the Plant Breeding Institute, Cambridge, England. Differential responses were observed when the winter barley Friedrichswerther Berg and the spring barley Kenia were vernalized by 0-6° C for 10-40 days. Kenia showed neither the progressive reduction in lamina length nor the hastening of flowering characteristic of the winter barley.

- 181 Het onderzoek op het gebied van het broodgraan in 1953. (**Research in the field of grain cereals in 1953**).

Derde Cocobro-Jaarbje. 1953 : 87-103.

The research programme for 1953 includes work on ecological and other factors affecting quality in wheat and rye; resistance to heat, cold, excessive rainfall, and drought; adaptability to environmental conditions; quality improvement; and the breeding of wheat, diploid rye, rye-wheat crosses and tetraploid rye.

- 182 SANDFÆR, J.
Studies on the basis of selection for yield in cereal crops.

Årsskr. K. Vet.- og Landbhøjsk. 1953 : 1-14.

The results of yield studies on several commercial varieties of oats and barley grown in Denmark are reported. Panicle number was shown to be associated with high grain yield in oats (cf. PBA, XII, Abst. 913), and a strong correlation was found between ear number and grain yield in barley. Single plant selection on the basis of inflorescence number is therefore advisable at the earliest possible stage. Well spaced barley selections growing on soil of high fertility at Albertslund produced a large number of ears, but lodging limited the grain yield in all varieties. Breeding for stiff straw must therefore accompany selection for a high number of ears in order to exploit the potential yield at present unavailable because of lodging.

- 183 JOHNSON, T.
Variation in the rusts of cereals.

Biol. Rev. 1953 : 28 : 105-57.

A critical survey is given of literature on variation and its causes in the cereal rusts, the

problem of specialization in relation to the production and cultivation of new cereal varieties receiving particular attention. In the concluding section, the author suggests that a combined genetical and physiological approach in speculating on the nature of rust resistance might lead to useful working hypotheses; the host-parasite relationship can be regarded as a purely nutritional one, and the genetic systems for virulence and host reaction primarily as systems controlling enzyme production. The bibliography contains over 200 references.

- 184 **Estación Experimental de Aula Dei. Departamento de Cereales. Información sobre datos obtenidos por este departamento en el año agrícola 1951-1952. (Aula Dei Experimental Station. Cereal Department. Information on data obtained by the department in 1951-52).**

Zaragoza Pp. 17. (Mimeographed).

The report presents the results of trials carried out with wheat and oat varieties with and without irrigation and at different sowing dates, and gives data on the reaction of the varieties to rust, mildew and smut, and such characters as number of ears per plant, number of spikelets per ear, ear density and number of grains per ear.

- 185 **Progress Report of the Dominion Experimental Substation, Regina, Saskatchewan 1947-1951 (1953) :** Pp. 37.

Particulars are given of varieties tested at the Dominion Experimental Substation on the Regina Plains. Thatcher and Rescue gave the highest yield of wheat, Exeter of oats, Vantage of barley and Victory of flax.

- 186 **Grain harvest of test plots proceeding at Experimental Station at Whitehorse, Yukon.**

Canad. Grain J. 1953 : 8 : No. 12 : p. 23.

Trials at the experimental station at Whitehorse in the Yukon have shown that the wheat varieties Saunders, Garnet, Reward and Prelude, the oat varieties Beaver, Ajax and Legacy and the barley varieties Olli, Titan, Newall and Prospect grow well under Yukon conditions.

- 187 **ERROUX, J.**

Comportement de quelques variétés de céréales dans les jardins Fezzanais. (**The behaviour of some varieties of cereals in Fezzan holdings**).

Bull. Liaison Saharienne 1952 : No. 11 : Pp. 8.

The main characteristics, comparative yield and

specific weight of grain are given for cereal varieties cultivated in the arable districts of the Sahara. In trials of barley, the early maturing variety US-43, of Syrian origin, gave the highest yield. Of the soft wheats, the early maturing hybrid Florence x Aurore [Dawn] 8193 which possesses good grain qualities and is recommended for cultivation on fertile soil in the northern territories, and the variety Khreci, were superior.

WHEAT

- 188 **HEINZEL, A.**

Zum Winterweizen-Anbau. (**On the cultivation of winter wheat**).

Kärntner Bauer 1953 : 103 : p. 447.

Data are given on varieties available and suitable for sowing in Carinthia. Most prominent is the variety Dr. Lassers Dickkopf Winterweizen [Dr. Lasser's Squarehead winter wheat]. Two other varieties, suitable for poorer soils, are being multiplied for release in the next few years. They are Dr. Lassers Hellkorn Winterweizen [Dr. Lasser's Bright-grained winter wheat] and Drauhofener Kolben Winterweizen [Drauhofen Club winter wheat].

- 189 **GADEA, M.**

Cuarto año de experiencias con nuevas variedades de trigos. (**Fourth year of experiments with new varieties of wheat**).

An. Inst. Invest. Agron., Madr. 1953 : 2 : 93-199.

Further data are added to those already published (cf. *PBA*, Vol. XXIII, Abst. 255).

- 190 **Briggs, F. N.**

Registration of improved wheat varieties XX.

Agron. J. 1953 : 45 : p. 317.

A description is given of the registered variety Sioux, developed by the Nebraska Agricultural Experimental Station (cf. *PBA*, Vol. XXIII, Abst. 242).

- 191 **Universální žito a ozimá pšenice "Przodownica." (A universal rye and the winter wheat Przodownica).**

Za Social. Zeměd. 1953 : 3 : 636-38.

New hardy and productive varieties of wheat and rye have been bred at Brudzan, Poland. The wheat, Przodownica, was derived from a cross between Lesper Wczesny [Early Lesper] and an unknown awned variety of wheat. It is early, shows resistance to drought, lodging, pests and diseases, and produces good quality grain. The 1000 grain weight is 45-50 g.

The new variety of rye, still unnamed, was obtained by intervarietal open pollination involving many Polish, Soviet, Swedish, German and Czechoslovakian ryes. It shows resistance to drought, shedding and lodging, and produces grain with good baking properties. The 1000 kernel weight is 42–49 g.

- 192 TÉLLEZ MOLINA, R.
Ensayos comparativos de rendimientos de trigos híbridos (II). [**Comparative yield tests of hybrid wheats (II).**].
An. Inst. Invest. Agron., Madr. 1953 : 2 : 201–32.

Further observations (cf. *PBA*, Vol. XXIII, Abst. 210), the results of which are presented in full, show several hybrids with yields surpassing that of 100–30.

- 193 FAJERSSON, F.
Två nya höstvetesorter, Weibulls Original Banco och Weibulls Original Ertus. (**Two new autumn wheat varieties, Weibull's Banco and Weibull's Ertus**).
Weibulls Årsb. 1953 : 1–5.

Both these wheats, whose quality and agricultural characteristics are discussed, have been noted in *PBA*, Vol. XXIII, Absts. 1847 and 1848.

- 194 FAJERSSON, F.
Weibulls Original Svenno-vårvete. (**Weibull's spring wheat Svenno**).
Weibulls Årsb. 1953 : 6–11.

This new, early, extremely stiff-strawed and high-yielding wheat, which is a sister variety of Kärn II [Kernel II], will be put on the Swedish market in 1954. It approximately equals Kärn II in hectolitre weight, protein content and baking quality, and its ear resembles that of Kärn II, but is about four inches shorter. In trials in Sweden, Finland and Norway, Svenno proved earlier than Kärn II and Diamant II [Diamond II]. In 1950, when mildew was prevalent, Svenno outyielded Pondus and it also did relatively well in the black rust epidemic of 1951.

- 195 KARAPETJAN, V. K.
(**Genetic analyses of rye-wheat and wheat-rye hybrids**).
Agrobiologija (Agrobiology) 1953 : No. 3 : 67–80. [Russian].

At the USSR Institute of Genetics, the percentage of grain set in direct and reciprocal crosses between wheat and rye was increased by the selection of more compatible parents and by the use of pollen mixtures. The percentage

of successful crosses was higher in wheat x rye than rye x wheat. The hybrids obtained between wheat and rye comprised mostly (1) heterotic sterile plants with intermediate characters and 28 chromosomes, and (2) vigorous, productive, hardy and fertile wheat forms with 42 chromosomes. The sterile plants bore grains, in a few instances, when pollinated with wheat or rye pollen. Later generations derived from these grains gave the initial species in a pure state. No F_1 or F_2 hybrids of rye x wheat have resembled the paternal parent. In spite of the failure to combine the characters of the two species, some hybrids were more productive and vigorous than their initial maternal parents.

- 196 YAMADA, T. & FUJIYOSHI, S.
(**Studies on the genetics of the tendency towards the prostrate habit in wheat and on the relation between this feature and the most important characters of the plant. I. Gene analysis**).
Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 185–94. [Japanese].

The mode of inheritance of juvenile habit, whether procumbent or erect, was studied in the F_1 – F_4 of Hokuriku 13 x Saitama 27. The F_1 was intermediate between the parents, and the subsequent segregation ratios suggested that juvenile habit was controlled by three gene pairs, each with incomplete dominance; these are denoted by E_1e_1 , E_2e_2 and E_3e_3 , respectively.

- 197 CICIN, N. V.
Nové odrůdy pšenice. (**New varieties of wheat**).
Za Social. Zeměd. 1953 : 3 : 757–60.

Descriptions of the wheat-*Agropyron* hybrids 599, 186 and 1 bred in the USSR (cf. *PBA*, Vol. XXIII, Abst. 2560) are given. Mention is also made of another Russian hybrid 22850, which is a spring wheat interesting for its good baking quality.

- 198 LARIČEVA, M. D.
(**Direct and reciprocal crosses between spring wheats**).
Agrobiologija (Agrobiology) 1953 : No. 2 : 104–06. [Russian].

In Moscow, direct crosses of *Lutescens* 62 x *Caesium* 111 and *Lutescens* 684/2 x *Caesium* 111 gave more viable F_1 seed than their reciprocals. In this respect the hybrids were also superior to their maternal parents, noted for their good seed viability. On the other hand, *Caesium* 111 transmitted its high yielding characteristics to its progenies in an intensified degree, when used

as the maternal parent in crosses with *Lutescens* 62 or *Lutescens* 684.

199 CICIN, N. V.

(New varieties of wheat).

Nauka i Žiznj (Science & Life) 1953 : No. 1 : 17-19. [Russian].

New varieties of winter wheat developed in recent years in the USSR include the hybrids 599, 186, 1 (cf. *PBA*, Vol. XXIII, Abst. 2560) and 2. Hybrid 599, from Saratov 46/731 x *Agropyron* sp., is early, shows resistance to lodging and bunt and produces large ears with good quality grain. Hybrid 186, from the hard wheat *Lutescens* 329 x *Agropyron* sp., is noted for its productiveness, earliness, resistance to lodging and good baking and milling properties. Hybrid 1, from the cross between the perennial wheat 34085 and an unspecified winter wheat, is interesting for its high yield and resistance to lodging. In the 1952 trials, in Latvia, it yielded 70.3 c. grain per ha. Hybrid 2 was obtained by multiparental pollination of *Lutescens* 329, involving a species of *Agropyron* and the winter wheat Saratov 46/131 as the pollen parents. It has a perennial habit and develops productive, white, awned ears bearing large vitreous grain. Some ears of the hybrid, which shows resistance to bunt, form 25-35 spikelets. The grain has a 25% protein content.

200 TOSUN, O.

Buğday x çavdar melezleri. 1943/44-1950/51 mahsul yıllarına ait deneme ve araştırma sonuçları. (Wheat x rye hybrids. Investigations and results for the crop years 1943-44 and 1950-51).

Bitki Yetiştirme Islahı Kürsüsü Çalışmalar. 1952 : Pp. 38.

Using *Triticum vulgare*, *T. durum*, *T. compactum*, *T. turgidum* and other *Triticum* spp. as the female parents, wheat-rye crossing was initiated in 1939 at the Institute for Plant Breeding and Improvement, Ankara. F_1 progenies were increased vegetatively, most of them consisting of *T. vulgare*-rye hybrids. These progenies were completely pollen-sterile, and partly female-sterile. They were therefore open-pollinated, or back-crossed with pollen from wheat or rye. Only 78 seeds were secured, of which about half sprouted. F_2 plants, also vegetatively multiplied, showed a much higher degree of fertility, and were open-pollinated. Elite material was produced and tested, in cooperation with other institutes. Twenty-eight of the hybrids are now considered promising, some of

them outyielding improved ordinary wheats by 20-30%. Their seed weight compares favourably with that of Turkish and introduced wheats; their hectolitre weight often exceeds that of the best American varieties. They also possess satisfactory baking properties and good resistance to drought, winter conditions and bunt. More extensive trials are however necessary.

201 NAKAJIMA, G.

[Cytogenetical studies of the triple hybrid (*Triticum turgidum* x *Secale cereale*) x *T. vulgare*. III. The characteristics and chromosomes of the F_1 and F_2 plants].

Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 93-99. [Japanese].

Continuing his researches on the above cross (cf. Absts. 202 and 203), the author describes the inflorescence characters, fertility and chromosome numbers of the F_2 . The chromosome numbers were bimodally distributed, those from the progeny of the $2n = 41$ F_1 plants varying between 28 and 33 and between 37 and 47, and those from the $2n = 42$ F_1 plants varying between 28 and 33 and between 42 and 48.

202 NAKAJIMA, G.

[Cytogenetical studies of the hybrid (*Triticum turgidum* x *Secale cereale*) x *T. vulgare*. II. A. Meiosis in the pollen mother cells of F_1 plants].

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 105-18. [Japanese].

Metaphase configurations are described for the F_1 of the above cross. The chromosome number was usually between 39 and 42 inclusive. The number of bivalents varied from 10 to 17. It appears that some allosyndetic pairing took place between the A and B and between the R and D genomes. An occasional single trivalent or tetravalent was noted. In one individual, in whose other cells $2n = 42$, a cell was observed with the configuration $13_{II} + 30_I$, apparently due to duplication of the D and R genomes.

203 NAKAJIMA, G.

[Cytogenetical studies of the triple hybrid (*Triticum turgidum* x *Secale cereale*) x *T. vulgare*. II. B. Meiosis in pollen mother cells of an F_1 plant with $2n = 44$ chromosomes].

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 199-202. [Japanese].

Meiotic configurations in the F_1 of the above-

cross ranged from $12_{II} + 20_I$ to $4_{II} + 36_I$, the modal value being $8_{II} + 28_I$.

204 VILLAX, E. & MOTA, M.

Behaviour of a *Triticum* x *Secale* hybrid under the action of colchicine.

Nature, Lond. 1953 : 172 : 412-13.

An untreated culm of an F_1 hybrid plant obtained by crossing the wheat Ardito with the rye Petkus at the Estação de Melhoramento de Plantas, Elvas, Portugal, produced a sterile spike typical of *Triticale*. Other culms, injected 5-7 times with 0.05% colchicine, stopped growing, but adjacent untreated culms were reduced in growth and gave normal fertile spikes. Two plants from grains in these spikes were examined cytologically; their chromosome number was $2n = 42$, instead of the expected 56. One of these plants has reached maturity and is identical with the wheat Ardito. It is suggested that the rye chromosomes were lost as the result of the action of the colchicine, which had passed from the treated culms to the untreated ones. Knobs characteristic of rye chromosomes were not observed in either plant.

205 **Large-scale tests with new wheat hybrids.**

Soviet News 1953 : No. 2788 : p. 4.

Hybrids between wheat and couch grass, developed by N. Tsitsin [N. Cicin], are said to be giving good results in extensive tests in the USSR. They have yielded up to 56 cwt. per acre, and possess a 1000 grain weight of 55 gm., compared with 28-30 gm. for wheat. They are highly resistant to disease and to lodging, and have good quality for bread making. The hybrids are taking the place of rye in the non-black earth region.

206 FUKASAWA, H.

(Studies on nuclear substitution of *Aegilotriticum* by successive back-crossing).

Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : p. 225. (Abst.). [Japanese].

Using the amphidiploid of *Aegilops ovata* ♀ x *Triticum durum* ♂ as female parent, successive backcrosses were made to both the original parents. Eventually, the parental types, with the respective chromosome numbers of the original parents, were recovered, the cytoplasm in each case, however, being derived from the amphidiploid.

207 NAKAJIMA, G.

[Genetical and cytological studies on the breeding of amphidiploid types of wheat-rye. II. The external characters and chromosomes of the fertile F_1 of club wheat (*T. compactum*, $n = 21$) and rye (*S. cereale*, $n = 7$) and of the F_2].

Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : 191-99. [Japanese].

The F_1 of the above cross had $2n = 28$ chromosomes and most closely resembled *Triticum compactum*. Pollen grains with approximately 14 or 28 chromosomes were produced, the latter by restitution. From the $2n$ type of pollen grains, amphidiploids ($2n = 56$) were produced in the F_2 , together with aneuploids with $2n = 47, 48, 54, 55$ or 58 chromosomes.

208 MJAGKOV, N. V.

(Branching wheat as material for developing new varieties).

Agrobiologija (Agrobiology) 1953 : No. 3 : 151-52. [Russian].

Changes were observed in a branching wheat originating from the Timirjazev Agricultural Academy, Moscow, when grown for several generations under the climatic and soil conditions of Pučez, Ivanov province. The new forms developed from the branching wheat included the hard wheat varieties *hordeiforme*, *coerulescens* and *melanopus*, and the soft wheat varieties *gracuum*, *erythrospermum*, *milturum*, *ferrugineum* and *hostianum*. Some of the soft wheats had spring, others winter habit. Many promising forms, interesting for their productivity, large ears, good quality grain, and resistance to lodging, shedding, pests and diseases, have been selected. Some of the new hard wheats were remarkable for their high yields and their grain was yellow and vitreous. Their 1000 kernel weights were 45 to 60 g.

209 MOROZOV, P. V.

(Conversions in branching Kahetian wheat).

Agrobiologija (Agrobiology) 1953 : No. 2 : 30-31. [Russian].

A *Triticum turgidum* variety, Vetvistaja Kahetinskaja [Branching Kahetian], produced in its progeny some *T. vulgare* and *T. durum* plants and a few individuals of naked six-rowed barley, when grown in a pure state for two or three generations under the climatic conditions of the Moscow province. Promising forms of *T. durum* and *T. vulgare* have been selected from the original *T. turgidum* variety.

- 210 JUNGFER, E.
Speltoid- und Compactoidmutationen.
(**Speltoid and compactoid mutations**).
Züchter 1953 : 23 : 273-80.

Speltoid and compactoid mutations of wheat were examined. Both are associated with deficiencies in the C chromosome, synonymous with Sears's ninth chromosome, the likelihood being that two genetical factors are operating, the lack of either causing a speltoid or compactoid mutation to appear.

B series speltoid mutations were shown to be due to loss in chromosome substance, observable under the microscope, in the long arm of the C chromosome. The plants concerned were heterozygous, the progeny of two plants showing segregation in the proportion 77 : 8 and 48 : 8, respectively. Cytological examination of pollen meiosis of speltoid heterozygotes showed irregularities in metaphase I and anaphase I and II. In the B series the chromatids of the C chromosome, especially when the latter is present as an univalent, have a tendency to break at the centromere.

Compactoid mutations can segregate in a number of different ways, showing that more than one genotype is involved. All however are characterized by a higher proportion of the appropriate section of the C chromosome than in normal wheats.

- 211 MOKROV, S. V.
(**The evolution of species in wheats**).
Agrobiologija (Agrobiology) 1953 : No. 2 : 10-17. [Russian].

At Odessa, a *Triticum durum* variety, Melanopus 69, produced in its progeny the soft wheat varieties *lutescens* and *erythrospermum* when sown in late autumn, and *T. vulgare* var. *lutescens* produced some *erythrospermum* and *milturum* forms.

- 212 FILIMONOVA, T. G.
(**Changing the spring wheat Milturum 321 into a winter wheat**).
Agrobiologija (Agrobiology) 1953 : No. 3 : 101-04. [Russian].

Many winter forms were obtained when the variety was sown in late autumn for 1-6 generations at Omsk. Some of them were different botanical varieties from that of the initial material. Microscopic analyses of some of the new winter forms showed that they had less pubescent leaves than the normal spring wheat Milturum 321. The material trained for winter habit showed higher percentages of total sugars

each year it was grown as a winter wheat, and an increased capacity for retaining water by the protoplasmic colloids.

- 213 NEDEŠEVA, G. N.
(**The influence of low temperatures during the vernalization phase upon the inheritance of plants**).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952 : No. 19 : 72-81. [Russian].

The winter wheats *Lutescens* 329, *Hostianum* 237 and *Durable* were changed into spring wheats under laboratory conditions. The method consisted of subjecting the material to low temperatures during their vernalization periods for two years in succession. The treatment shattered their inheritance in the first year and promoted early earing in the second. The best results with the very hardy *Lutescens* 329 were obtained when it was given 20 days normal vernalization treatment, 20 days at -5°C and 40 days at -9°C . The best treatment for *Durable* was 20 days normal vernalization and 60 days at -5°C .

- 214 STOLETOV, V. N. & GLONTI, E. I.
(**The results of breeding and selecting winter wheat plants which ear precociously when sown in the spring**).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952 : No. 19 : 62-71. [Russian].

Hybrids between precociously earing individuals of *Ukrainka* x *Lutescens* 329, *Lutescens* 329 x *Moscow* 2411 and *Ukrainka* x *Moscow* 2411 gave a higher percentage of early-earing plants when selected for three generations at *Moscow* than pure-line material selected for precocious earing.

- 215 GURČENKO, V. S.
(**A highly productive variety of spring wheat**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 44-47. [Russian].

At Stalino, the variety *Artemovka* was obtained by single plant selection from a wheat originating in the Kremenčug district. It shows a higher degree of resistance to drought, pests and loose smut than *Lutescens* 62 and *Milturum* 162, which it outyields under the conditions of the Ukrainian open and woody steppe. Moreover, it has a better tillering capacity and grain set than *Lutescens* 62. It is earlier and produces 96% of vitreous grain with good baking and milling properties.

- 216 BJAANES, M.
Norrøna. (Norrøna).
Samvirke 1953 : 48 : 124-26.

To meet Norway's need for a spring wheat combining earliness with high yield, the new variety Norrøna, bred from a cross of the Norwegian wheat Fram II and the early Finnish variety Söpu, has been released. Its performance, as compared with its parents and Diamant II [Diamond II], Trym and Ås II in trials during 1948-52 at Møystad Experimental Station and in outlying field trials in Hedemark and Opland, is shown in a table. In addition to its superiority in grain yield, Norrøna has a short straw which lodges relatively little, though it is not as stiff as Diamant II. Its baking quality is good. At Møystad, Norrøna outyielded Diamant II by 32 and Ås by 30 kg. per dekar, and was respectively seven and four days earlier than those two wheats.

- 217 KARAPETJAN, V. K.
(The evolution of plant species.
Conversions of wheat into rye).
Trudy Inst. Genetiki (Proc. Inst. Genet.)
1952 : No. 19 : 16-37. [Russian].

Mičurinite investigations of interspecific conversions at the Institute of Genetics (cf. *PBA*, Vol. XXII, Abst. 1060) have continued. Cytological analyses of rye plants, derived in earlier experiments from rye grains found in the ears of *Triticum vulgare* and *T. durum*, showed that $2n = 14$. In two instances, grains of the rye type found in the ears of hard wheat gave *T. dicoccum* plants. These plants had the $2n = 28$ chromosomes characteristic of *T. dicoccum*. Some fertile rye plants were obtained by sowing wheat grains taken from the ears in which some rye grains had been found. These rye plants developed from grains of the wheat type without producing any intermediate forms. They produced, even when emasculated and bagged, some viable seed which developed into normal rye with $2n = 14$ chromosomes.

- 218 MANGELSDORF, P. C.
Wheat.
Sci. Amer. 1953 : 189 : 50-59.

A popular survey is given of the antiquity, geographical distribution and evolution of *Triticum* species, and of modern wheat breeding.

- 219 MATSUMURA, S.
(Studies on pentaploid wheat hybrids).
Idengaku Zasshi/Jap. J. Genet. 1951 :
26 : 211-18. [Japanese].

In this lecture, the speaker summarizes the results of his researches on genome analysis in

wheat during the preceding 15 years. The original papers publishing his investigations have already been summarized in *Plant Breeding Abstracts*.

- 220 STEINITZ-SEARS, L. M. & SEARS, E. R.
Chiasmata and crossing over in a
dicentric chromosome in wheat.
Genetics 1953 : 38 : 244-50.

The occurrence of a dicentric chromosome consisting of a long arm, a main centromere, an intercentromeric region, a second relatively weak centromere and a minute arm has been previously reported (cf. *PBA*, Vol. XXII, Abst. 2594). Further studies have shown that in plants with two dicentrics, these chromosomes usually pair throughout their length, and that no activity of the weaker centromere can then be detected. The frequency of chiasmata in the intercentromeric region did not correspond with the frequency of bridges at anaphase I. This discrepancy is not however regarded as critical evidence against the generally accepted theory that every chiasma represents a cross-over, since localization of chiasmata in the minute arm and premature separation of sister secondary centromeres cannot be entirely excluded as possible explanations.

- 221 YAMASHITA, K.
(Studies on reciprocal translocations
in Einkorn wheats. II).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 1-41. [Japanese].

Further to his studies on the building up of chromosome rings in strains of *Triticum monococcum* and *T. aegilopoides* carrying X-ray-induced reciprocal translocations (cf. *PBA*, Vol. XXII, Abst. 1068), the author describes individuals with up to 12-chromosome rings. Fertility in these forms could be represented by the expression $y = kdt$, where k is a constant, d , a disjunction coefficient, and t , the number of reciprocal translocation sets. Descriptions are also given of meiosis in *T. aegilopoides* x Emmer and in a hybrid between one of the homozygous reciprocal translocation types of Einkorn and Emmer.

- 222 YAMASHITA, K.
(Studies on reciprocal translocations
in Einkorn wheat : certation).
Idengaku Zasshi/Jap. J. Genet. 1950 :
25 : 30-31. (Abst.). [Japanese].

Selfing and back-cross experiments with an Einkorn wheat carrying a 6-membered ring of constitution $\frac{f-e}{f+e}g$ derived from X-ray-induced reciprocal translocations of *Triticum monococcum*

and *T. aegilopoides* respectively, showed a deficiency of e—g translocation types in the progenies. This is attributed to pollen competition in favour of the f—e translocation type.

223 MORRISON, J. W.

Chromosome behaviour in wheat monosomics.

Heredity 1953 : 7 : 203–17.

At the John Innes Horticultural Institution, England, a study was made of the 21 monosomic lines of the variety Chinese Spring (*Triticum vulgare*), developed and distributed by Sears. It was possible to compare the morphology of the 21 different chromosomes by studying lagging univalents at telophase II. Data from eight monosomics showed that 20 bivalents were formed in 97.6% of the pollen mother cells. Some chromosome mosaics with hypoploid or hyperploid cells were found at metaphase I in monosomic and disomic plants (cf. *PBA*, Vol. XXIII, Abst. 224). During telophase I and II, the univalents divided or misdivided and often lagged. Isochromosomes arose directly through misdivision at meiosis, and not indirectly through nondisjunction in the pollen grains. Pollen grains with 18 to 23 chromosomes were produced and underwent mitosis; 63% carried fragments, mostly telocentrics. The number of pollen grains with 20 chromosomes was twice the number with 21, but the former were only one-thirtieth as effective as the latter.

224 YAMASHITA, K.

Studies on X-ray induced reciprocal translocations in Einkorn wheats. IV. Autotriploids.

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 69–72.

Data are given on meiosis and pollen fertility in three triploids from crosses involving plants heterozygous for reciprocal translocations (cf. *PBA*, Vol. XXII, Abst. 264). The meiotic configurations, consisting of simple trivalent associations and their derivatives, suggested that chromosome doubling occurred after division I.

225 GASSNER, G.

Untersuchungen zur physiologischen Charakterisierung unserer Weizensorten. (Investigations into the physiological characterization of our wheat varieties).

Züchter 1953 : 23 : 193–206.

Experiments were carried out to determine the requirements of a period of low temperature in the developmental rhythm of a large number of German wheat varieties, and the effect of low

temperatures on the factors inducing formation of the flower was studied. Graphical representations are included showing the influence of vernalization on the different varieties.

Vernalization periods of from 30 to 60 days proved the most effective in inducing development. A temperature of very slightly above 0° C was found to give the best results, under conditions in which water was freely available.

226 GRILLOT, G. & CAZAL, L.

Note sur la fécondation du blé et la conservation des variétés. (A note on the fertilization of wheat and the maintenance of varieties).

Ann. Inst. Nat. Rech. Agron. Paris 1952 : Sér. B : 2 : 645–63.

Views on the floral biology of wheat are discussed, and instances of natural intervarietal and interspecific crossing at the Agronomic Research Centre, Rabat, are amplified by observations on flowering and fertilization in the wheat Florence x Aurore, widely grown in Tunisia and Morocco. The occurrence of allogamy in other varieties of wheat was also recorded and the possible role of late fertilization as a cause of natural crossing must be considered.

These findings have led to the introduction of revised methods of maintenance, reproduction and multiplication of cereal varieties at Rabat.

227 BAZAVLUK, V. Ju. & MEDVEDEVA, G. B.

(The effect of varied photoperiods upon the development of ears in hybrids between soft and branching wheats).

Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952 : No. 19 : 121–32. [Russian].

At Gorki Leninskie, some F_1 hybrids between *Triticum turgidum* var. *plinianum* and soft wheats eared 12 days earlier but produced fewer branching forms or plants with fewer spikelets and grains per ear, when given continuous illumination. The percentages of plants with more productive or branching ears were increased when the F_1 material was trained under ten-hour photoperiods. F_1 plants with branching ears gave a higher percentage of plants with branching ears in the F_2 . Selection of individual ears was appreciably more efficacious than single plant selection.

228 MEDVEDEVA, G. B. & BAZAVLUK, V. Ju. **(The floral biology of branching wheat).**

Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952 : No. 19 : 110–21. [Russian].

The causes for the development of unproductive

ears by the Kahetinskaja Vetvistaja [Branching Kahetian] wheat were investigated at the Genetics Institute of the USSR Academy of Sciences. It was found that the reproductive organs of many florets had been deformed and that some florets with well-formed organs also failed to produce seed. The pollen from different florets showed great variability, some anthers containing no normal pollen grains. Various meiotic anomalies that occurred are described. They included an abnormal transfer of nuclear substance from one cell to another.

229 VERVELDE, G. J.
The agricultural value of awns in cereals.

Netherlands J. Agric. Sci. 1953 : 1 : 2-10.
A preliminary examination of the F_2 of crosses between awnless wheats and bearded varieties at the Laboratory for Crop Husbandry, Wageningen, indicated that the bearded offspring were more vigorous and produced more ears and more grains per ear than the awnless progenies. The apparent vigour of bearded wheats was, however, due to an inexact separation of bearded and awnless types; vigorous awnless plants, homozygous for short tips on their glumes, were classified as bearded, while some of the less vigorous plants, heterozygous for bearded glumes, were taken for awnless individuals. Following accurate classification, verified by examining F_3 progenies, awns were shown to contribute 3-5% to grain yield due to photosynthetic activity, not to linkage. This conclusion was supported by comparing yields of deawned plants and bearded controls.

230 FAJERSSON, F.
Våra möjligheter att förbättra vetets bakkingskvalitet. (Our possibilities of improving the baking quality of wheat).

Svensk JordbrForsk. 1953 : 45-49.

Factors determining quality, e.g. the variety, its gluten quality and content and its protein content, are discussed with special reference to the effects of nitrogen manuring.

231 MAES, E. & PEETERS, G.
Recherches concernant la valeur boulangère de races sélectionnées de froment belge. (Investigations concerning the baking value of improved varieties of Belgian wheat).

Rev. Agric., Brux. 1953 : 6 : 1109-14.

In continuation of previous studies (cf. *PBA*, Vol. XXIII, Abst. 237), spring and winter wheats were tested for baking quality. Alba,

Blé d'Avril [April wheat] and Fylgia were classed as very good, while Ministre [Minister], Précocé de Gembloux [Early Gembloux] and Jubilé [Jubilee] were intermediate between the very good varieties and the worst group.

232 TEAKLE, L. J. H.
Soil and climatic factors affecting the baking quality of wheat.

Pap. Dep. Agric. Univ. Qd. No. 11 : Pp. 10.

This review includes a brief survey of breeding in Australia to improve the quality and quantity of protein in the grain, and, consequently, the baking quality of varieties.

233 BROEKHUIZEN, S.
Derde jaarverslag van de stichting Cocobro. (Verslag over 1952). [Third annual report of the Cocobro foundation. (Report for 1952)].

Derde Cocobro-Jaarbje. 1953 : 4-18.

Among the activities recorded is the work of the various research panels, including investigations of cold resistance and cold requirements of wheats (cf. *PBA*, Vol. XXIII, Abst. 2391). Quality studies included the investigations of baking value as a hereditary character in breeding material comprising wheat varieties of Western Europe.

234 JONGH, G. & DE MIRANDA, H.
Onderzoekingen betreffende de bakwaarde van in Nederland verbouwde tarwerassen. (Investigations regarding the baking value of the varieties of wheat grown in the Netherlands).

Derde Cocobro-Jaarbje. 1953 : 73-86.

Records of baking tests of the winter wheats Alba, Minister and Staring are discussed as well as data relating to the baking value of six other winter wheats and four spring varieties. The typical varietal differences found for Alba, Minister and Staring are shown in graphs.

235 BENATAR, R. & MÉNERET, G.
Adaptação do método Pelshenke às pequenas amostras de trigo. (Adaptation of the Pelshenke method to small samples of wheat).

Bol. Tec. Inst. Agron. Sul 1947 : No. 2 : 1-12.

A modification of the Pelshenke method making it possible to analyse grain samples of 2-2.5 g. is described. The grain is ground in a coffee mill, the flour mixed with an aqueous suspension of baker's yeast, the balls of dough are placed in

water at 32° C, and the time at which they burst is observed, together with the degree of expansion and the form of rupture. Indices of over 40 minutes are considered good. In experiments with F₈ and F₇ selections of 18 different wheat hybrids the variation within a sample was about 15%. Some of the hybrids, e.g. Renown x Sinvaloch and Sinvaloch x Riosulino, had indices of over 130, which is considerably higher than that of either parent.

- 236 KIRIČENKO, F. G., ILJIČEVA, N. V. & VIŠNEVSKIĖ, V. V.

(The choice of wheat varieties for cultivating on the irrigated lands in the southern Ukraine).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : 11-23. [Russian].

Breeding wheats adapted to cultivation under irrigation at the USSR Institute of Breeding and Genetics, Odessa, is referred to. Of the winter standards tested on irrigated land, Odessa 16 proved the most productive and showed the highest degree of resistance to lodging. It is hardy, shows resistance to drought and has good baking properties. In the 1952 trials, the new promising winter wheats Pimenka, 289/48 and 375/48 outyielded Odessa 16. In the preliminary trials with spring wheats, several hard wheats and the soft wheat *Lutescens* 1163, noted for its resistance to lodging, gave good results under irrigation. *Melanopus* 213/51 outstripped all others in yield, with *Narodnaja* [People's] a close runner-up. Both wheats showed a higher degree of resistance to lodging than the other hard wheats.

- 237 KUČUMOV, P. V. & ZDRILJKO, A. F.
(Spring wheat varieties for cultivation under irrigation).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : 45-50. [Russian].

The varieties tested on irrigated lands at the Bril'evskaja research station, Ukraine, included the new wheats *Hordeiforme* 46-500 and *Otečestvennaja* [Fatherland], both developed at the Har'kov State Breeding Station. They are midseason types. *Hordeiforme* 46-500 is a productive hard wheat showing resistance to diseases and pests. *Otečestvennaja* is a soft wheat showing resistance to loose smut, but susceptible to *Phytophaga destructor*. In the

1951 trials, *Hordeiforme* 46-500 outstripped all others in yield.

- 238 HOFMANN, E. & AMBERGER, A.
Die Wirkung der N-Düngung bei verschiedenen Winterweizen- und Sommergerstensorten. I. Mitteilung. **(The effect of nitrogen manuring on different varieties of winter wheat and spring barley. First report).**

Z. PflBau 1953 : 4 : 124-36.

Variety trials were conducted over a three-year period. Of the winter wheats, Taca and Erbachshofer Braun [Erbachshof Brown] gave the highest yields of both grain and straw. Hauter II reacted best, with increased grain and straw yields, to treatment with nitrogen and was also the variety most resistant to lodging.

Of the summer barleys, Isaria, Müllers Franken II [Müller's Franconia II] and Breuns Franken III [Breun's Franconia III] gave the highest yields, whilst Strengs Franken III [Streng's Franconia III] and Firlbecks Weihenstephaner Mehlauresistente III [Firlbeck's Weihenstephaner Mildew Resistant III] reacted best to treatment with nitrogen. Strengs Franken III, the variety most resistant to lodging, gave the highest yield of straw and also showed the greatest proportionate increase in straw yield when treated with nitrogen.

- 239 DEKAPRELEVIČ, L. L. & SIHARULIDZE, M. A.
(A study of artificially mixed sowings of wheat).

Agrobiologija (Agrobiology) 1953 : No. 2 : 3-9. [Russian].

In Georgian experiments with mixed sowings the material consisted of forms making up the population known as *Doliš-Puri* [Drum wheat]. The yield of *erythrospermum* and *ferrugineum* seed, mixed in certain proportions, exceeded the yields of the varieties grown separately in some seasons, while in others the mixed seed gave the same or a lower yield than the pure varieties. Most mixtures of vars. *erythrospermum* and *ferrugineum* were more productive under drought conditions than the higher-yielding component grown in a pure state. The highest yields were obtained from mixtures with 60-75% *erythrospermum* seed. The advantage of mixed sowings over pure varieties was less apparent in years with ample rainfall. All the same the yields from mixed fields, in which *ferrugineum* forms amounted to more than 80%, were higher than those from pure varietal fields.

240 MALJCEV, T.

(Agricultural methods of obtaining high annual yields in the Transurals).

Kolhoznoe Proizvodstvo (Collective Farming) 1953: No. 8: 58-60. [Russian].

Mention is made of a new wheat, *Lutescens* 758, developed at the Agricultural Institute of the Southeastern USSR. It is more adapted to the climatic conditions in the Kurgan province than *Milturum* 553 and *Lutescens* 956, and shows resistance to lodging, shedding, drought and fungi.

241 **Varieties of winter wheats.**

Fmrs' Leaflet. Nat. Inst. Agric. Bot. 1953: No. 8: Pp. 5.

Data are presented on varieties of winter wheat recommended for sowing in England in 1953, namely Bersée, Holdfast, Hybrid 46, Juliana, Redman, Squarehead's Master, Staring, Victor and Yeoman. The following varieties are also recommended for 1953 but will be withdrawn in 1954: Jubilegem, Squarehead II, Steadfast, Warden, Wilhelmina and Vilmorin 27. Little Joss, Rivet and Rampton Rivet are listed as varieties of more limited use, but possessing characteristics of value in special circumstances. The varieties Cappelle Desprez, King II and Pilot are provisionally recommended.

242 NOORDHOFF, L. J.

Rust-resistant Anderson wheat increased for Carolinas.

Sth. Seedsman 1953: 16: No. 7: 52, 56.

Anderson, a recently developed variety adapted to conditions in South Carolina (cf. *PBA*, Vol. XXII, Abst. 1806), is now recommended for the Coastal Plain and Piedmont areas of North Carolina. It is, however, damaged by low temperatures and therefore not suitable for mountainous regions.

243 TRUHILOVA, A. T.

(New data on changing the spring wheat Milturum 321 into a winter wheat).

Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952: No. 19: 38-61. [Russian].

Results summarized in *PBA*, Vol. XXII, Abst. 1048 are supplemented with some new details of changes occurring in *Milturum* 321 spring wheat when trained for the winter habit at Omsk, Čeljabinsk and Odessa. It was found that many of the winter forms obtained by sowing *Milturum* 321 in late autumn for one or more years had the morphological characters of *lutescens*, *ferrugineum* and *erythrospermum* wheats, while only a small percentage of the

plants which acquired the winter habit resembled the initial botanical variety. The progenies of individual ears of the experimental wheats behaved like sexual hybrids between spring and winter wheats. They segregated in respect of spring and winter habit and in respect of morphological characters. Some seed from ears with a recessive character gave some progenies with the recessive character and others with the corresponding dominant character. The winter forms of *Milturum* 321 obtained at Omsk and Čeljabinsk showed, under Siberian conditions, as high a degree of winter hardiness as *Lutescens* 329.

244 PIPER, M.

Stepen ozimosti nekih najrasprostranjenijih sorata pšenica u FNRJ. (The degree of winteriness of some of the most widely cultivated wheat varieties in Yugoslavia).

Arh. Poljopr. Nauk. 1952: 5: 3-27.

The results of phasic analyses by Lysenko's method of many Yugoslav wheats are reported from Zemun and Skoplje. Some varieties from Slovenia and Vojvodina, requiring low temperatures for periods exceeding 35 days before they could pass through their vernalization phase, are regarded as hardier than others which had a shorter vernalization period.

245 **(Selected varietal seed for every collective farm).**

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953: No. 3: 6-10. [Russian].

Several varieties of wheat, oats and sunflower, developed in recent years in the USSR, are briefly described. The new spring wheats include Narym 1, interesting for its earliness and resistance to lodging.

246 SKORNJAKOV, S. M.

(Wheat in the Moscow province).

Sovetskaja Agronomija (Soviet Agronomy) 1953: No. 2: 21-26.

Mention is made of a new large-grained productive winter variety, wheat-Agropyron Hybrid 186, which shows resistance to lodging. The 1000 kernel weight of this hybrid is 49.7 g.

247 PAL, B. P.

Some new and noteworthy wheats.

Indian Fmg 1953: 3: No. 6: 18-19, 32.

Five varieties of New Pusa wheats are described. NP 710, NP 718 and NP 761 are selections from the cross NP 52 x NP 165. The first two are characterized by high yield, good quality grain,

and adaptability to a wide range of conditions. They have a high degree of resistance to loose smut and are tolerant of or resistant to most races of rust. NP 761 is a very early maturing variety, with high yields and a moderate degree of resistance to rust diseases.

NP 775 is a natural hybrid of NP 4. It is tolerant of rust diseases, especially black rust, and gives a high yield of superior quality grain. NP 770, a cross between the Japanese variety Kononso and NP 4, is highly resistant to loose smut and comparatively resistant to rust diseases, especially yellow rust. It gives a high yield of good quality grain and despite its exceptionally tall straw does not lodge easily. It is considered suitable for cultivation at high altitudes.

- 248 PISAREV, V.
(**The spring wheat Moskovka**).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 6 : p. 59. [Russian].
Moskovka [Moscow] outyields Lutescens 62 in the Non-Black-Earth Belt and shows resistance to smut, rust and *Fusarium*. It produces large semivitreous grain with good baking and milling properties.

- 249 FUTRELL, M. C.
The influence of greenhouse temperatures on the development of *Erysiphe graminis tritici* on wheat seedlings.
Phytopathology 1953 : 43 : 290-91. (Abst.).
Seedlings of 15 spring wheats were tested for their reaction to powdery mildew at 16, 20, 24 and 28°C in the greenhouse. Susceptible varieties showed maximum infection at 20°C; infection at 16° and 24° C was however only slightly less. The reaction of Hope varied more according to the temperature than that of other varieties. Khapli, *Triticum timopheevi* and hybrid selections involving the latter exhibited a high degree of resistance at all temperatures.

- 250 DEN SHEN TU
Factors affecting the reaction of wheat varieties to head blight infection caused by *Gibberella zeae*.
Abstr. Doct. Diss. Univ. Ohio 1950-51 (1953) : No. 64 : 527-30.

In the greenhouse, Trumbull, Thorne, Seneca and Butler proved equally susceptible to head blight induced by injecting a mixture of 15 strains of *G. zeae* within the florets. When sprayed with inoculum, however, Trumbull showed greater resistance to infection than the other varieties. This differential reaction to head blight occurs under natural conditions in

Ohio. Susceptibility is shown to be correlated with a long diurnal period during which florets are open, and with both extrusion and retention of anthers.

- 251 HANNAH, A. E.
Inheritance of reaction to bunt in crosses involving Redman wheat and some of its ancestors.
Diss. Abstr. 1953 : 13 : Publ. No. 4856 : p. 156.

Crosses of Redman, its parental varieties Regent and Canus, and one grandparent, Reward, were made to determine the inheritance of resistance to race 1 of *Tilletia foetida*. Canus, Redman and Regent were classified as resistant, and Reward as susceptible. The Regent and Canus genes conditioning resistance appear to be different.

Tests of selected F₄ lines against two additional races of bunt, race 2 of *Tilletia caries* and a virulent race of *Tilletia foetida*, T.F. 48-7, showed that either the Canus or the Regent genes gave complete resistance to the former, but only partial resistance to the latter. Certain lines, including the Redman genotype, contain both Regent and Canus genes and give effective resistance to all three races of bunt.

- 252 YOUNG, H. C. (JUN.) & WADSWORTH, D. F.
Collection and race isolation of wheat leaf rust in Oklahoma.

Phytopathology 1953 : 43 : p. 294. (Abst.).
In both 1950 and 1951, leaf rust races 5, 15, 105 and 9 constituted over 85% of the collections. Several samples of race 105 were capable of attacking Westar and many other derivatives of Hard Federation, normally resistant to this race. The occurrence of these biotypes is important, since Westar and two other hybrids of Hard Federation, CI 12517 and CI 12515, have shown outstandingly good yields in the south western region of hard red winter wheat production.

- 253 **Report of the International Wheat-Stem-Rust Conference held at Fort Garry Hotel, Winnipeg, Canada, January 5-7, 1953 : Pp. 133. (Mimeographed).**
Stakman, E. C., Hart, H. & Stewart, D. M. *The present status of the stem rust problem.* (pp. 2-5).

The problem of stem rust of wheat in North America is discussed with reference to the rapid spread of race 15B, biotypes of this race, the need for more adequate tests to identify biotypes,

possible changes in the race situation in the near future, and the genetical and other investigations required.

Johnson, T. *Distribution of races of wheat stem rust in Canada in 1951 and 1952.* (pp. 5-7).

In 1952, two strains of 15B, designated 15B-1 and 15B-2, were differentiated by means of the reaction of Golden Ball. Race 15B had a wider distribution in 1952 than in the preceding year, occurring in collections from all provinces except Prince Edward Island.

Stakman, E. C., Hart, H., Postigo, R. & Goto, S. *Biotypes within races of stem rust.* (pp. 7-10).

Using 99 wheat varieties in addition to the standard differentials, 14 biotypes of race 15B of stem rust have been identified at the Federal Rust Laboratory, St. Paul, Minn. Biotypes of race 11 of stem rust of wheat and of race 7 of stem rust of oats have also been distinguished. Probably most races of stem rust of wheat comprise biotypes, but their separation prevents a number of difficulties.

Borlaug, N. E., Narvaez, I. & Enciso, T. *The rapid increase and distribution of stem rust race 49 further complicates the program of developing stem rust resistant wheats for Mexico.* (pp. 10-12).

Hope, Timstein, Thatcher, Gabo, the Brazilian varieties and their derivatives have generally proved resistant to race 49 in Mexico. Kenya 338 AC 2 E 2 is one of the few Kenya wheats resistant to races 15B and 49. Some lines from the following crosses combine resistance to 15B, 49 and the common races, and are being increased for commercial release: (Egypt Na 101 x Timstein) x Mayo 48; Kentana x Yaqui 48; and Kenya x (Mentana² x Supremo 211). In view of the rapid shifts in the populations of races of stem rust, extensive greenhouse testing of the reaction of breeding material to individual races, by means of international cooperation, is advocated, to supplement the field data secured from the cooperative inter-American nurseries.

Hayden, E. B., Smith, D. H. & Stakman, E. C. *The pathogenicity of races 11, 49, and 139 of Puccinia graminis tritici to Kenya wheat varieties and their derivatives.* (p. 13).

Races 11, 49 and 139 can attack certain Kenya wheats and their derivatives under a wide range of environmental conditions. At the Federal Rust Laboratory, Kenya 338 AA 1 A 2 and Kenya 338 AC 2 E 2 have exhibited resistance to the above three races, and also to 15B. Varieties

deriving stem-rust resistance from Timstein, Thatcher, Frontana and Vernal possess resistance to 11, 49 and 139, but under certain conditions are moderately susceptible to some biotypes of 15B.

Smith, D. H. & Hayden, E. B.

Differences in pathogenicity among isolates of race 11 of Puccinia graminis tritici. (pp. 13-14).

Evidence of several biotypes of race 11 has been obtained at the Federal Rust Laboratory. One isolate of this race and another of 32 were particularly virulent upon Khapli emmer, a standard differential. Both these isolates were extremely sensitive to environmental conditions; higher temperatures tended to increase sporulation; high temperature combined with full light was conducive to chlorosis and necrosis in the host. The two isolates were less pathogenic than a composite of isolates of 15B, when tested at both moderate and high temperatures on breeding lines having resistors to 15B and Khapli in their parentage.

Reactions of wheats from the world collection to 8 races of stem rust in the seedling and adult stages at 65-70° F. and 80-85° F. in the greenhouse at Beltsville, Md., 1951-52. (pp. 15-16).

Many of the 196 wheats tested were resistant to each race under all conditions; others were susceptible in the seedling and resistant in the adult stage. More varieties were susceptible to 15B than to any other race. Temperature greatly affected the reactions of many varieties, particularly the Kenya wheats. Some varieties were highly resistant at the lower range of temperature but completely susceptible at the higher range; in some wheats this variability occurred with all races.

Hart, H. & Stakman, E. C. *Variability in rust reaction.* (p. 19).

Varietal reaction to a race of stem rust may vary according to the temperature, light intensity, day length and other environmental conditions.

Lowther, C. V., Theis, T. & Rodenhiser, H. A. *Summary report on the reaction to stem rust at Saint Croix, Virgin Islands: Mexico: and Beltsville, Maryland, in 1951-52.* (pp. 19-20).

Several sources of resistance to the races of stem rust used, including a composite of biotypes of 15B, were found. Some introductions from Kenya showed outstandingly good resistance. Other resistant wheats included hybrids involving Egypt Na 101, and a few Frontana x Newthatch selections. Sources of resistance

were also discovered among the *Triticum durum* wheats.

Dickson, J. G. *The effect of temperature upon wheat seedling reaction to 15B of Puccinia graminis tritici.* (p. 20).

Tests were carried out at Madison, Wis., on the seedling reaction of new selections to 15B at 16° and 24° C, under conditions of good light and a day length of 9-10 hours. Twenty-six showed resistance at 16° but susceptibility at 24°; 2 were susceptible at 16° but resistant at 24°; 26 exhibited the same response at both temperatures. Kenya derivatives tended to be more susceptible under conditions of high temperature, but there were a number of exceptions.

Green, G. J. *Effect of environment on varietal reactions to stem rust of wheat.* (pp. 21-22).

From work in Canada, further evidence is given of the importance of temperature upon varietal reaction to stem rust. Any difference in reaction according to temperature has always consisted of greater susceptibility at higher temperatures; increased susceptibility to a particular race has not, however, necessarily been accompanied by greater susceptibility to all other races. Varieties resistant at lower temperatures in the greenhouse have usually shown good resistance in the field at Winnipeg. The resistance of some varieties may however break down during abnormally hot weather, as in 1951.

Johnson, T. *Biotypes in race 15B.* (pp. 22-23).

Two biotypes of 15B, 15B-1 and 15B-2, have been identified in Canada; certain other cultures may represent an intermediate type. Some evidence has been secured suggesting the existence of strains of 15B differing in degree of parasitic vigour rather than in host specialization.

Johnson, T. *Varietal tests with stem rust races collected in 1951 and 1952.* (pp. 23-26).

Tests were carried out on seedling reactions to race 15B and nine other races collected in Canada during 1951. Among the *T. vulgare* wheats highly resistant to all the races were McMurachy and some Kenya varieties. The biotype 15B-2 did not differ from other cultures of 15B, with respect to virulence upon *T. vulgare* varieties; it was however distinctly more virulent on both seedling and adult plants of Golden Ball (*T. durum*) and several hybrids involving this wheat.

Johnson, T. *Panel on leaf rust.* (p. 26). Cooperation in distinguishing new races and biotypes by means of host varieties other than the older differential wheats is advocated.

Brown, A. M. *Distribution of physiologic races of leaf rust in Canada, 1951 and 1952.* (pp. 26-28).

The prevalent races can be grouped on a geographical basis.

Johnston, C. O. *Prevalence and distribution of physiologic races of the leaf rust of wheat in the hard red winter wheat growing area of the United States.* (pp. 28-29).

Marked changes in the prevalence of different races during the five-year period 1947-51 are reported. Evidence is accumulating that environmental conditions, through causing fluctuations in the reactions of differential varieties, have a considerable effect upon the determination of physiological races, some of which appear to be merely ecotypes. Evidence has been obtained of definite biotypes within some races.

Levine, M. N. *Prevalence, distribution, and pathogenicity of wheat leaf rust races in the Upper Midwest region of the United States.* (pp. 29-30).

Little change has occurred in the composition of the races isolated from collections obtained during the three-year period 1950-52. Biotypes of certain races have however been identified by means of the reaction of Lee and other wheats.

Levine, M. N. *Sources of resistance to leaf rust of wheat.* (pp. 31-32).

Information is given on the varieties and hybrid selections, chiefly of spring wheat, found resistant to many races of leaf rust in seedling tests at St. Paul, Minn.

Caldwell, R. M. & Schafer, J. F. *Current status of wheat leaf rust in Indiana.* (pp. 32-33).

In addition to the 8 standard differentials, 14 auxiliary varieties are being used in race identification. In the past three years, race 76 or 58 has predominated; race 5 has been second in importance. Two new biotypes complicate the breeding programme: (1) a biotype of race 35, attacking 3369-61-1 (Wabash x American Banner); and (2) a biotype of race 104 or 30, differentiated by the seedling reaction of CI 12660 (Warden x Leap).

Brown, A. M. *Wheat varieties resistant to leaf rust at Winnipeg, Man. in 1951 and 1952.* (pp. 33-35).

A list is provided of varieties and hybrid

selections with 5% or less infection when exposed to artificial epidemics of leaf rust under field conditions at Winnipeg during 1951 and 1952. The high degree of resistance of many of the hybrids indicates that the resistance of varieties such as Frontana, Frondoso and Surpresa has been transferred with little or no diminution.

Young, H. C. (Jun.), Wadsworth, D. F. & Schlehuber, A. M. *Observations on leaf rust race isolations in Oklahoma.* (pp. 35-37).

A key is given for identifying races in Oklahoma by means of seven differentials. The distribution of races is related to "preferences" for different varieties, such as that shown by races 9 and 15 for Kiowa, Tenmarq and Comanche, or of race 15 for Triumph and Pawnee. Two biotypes of race 105, designated 105A and 105B, and distinguished by means of Westar and Westar selection, attack many Hard Federation hybrids that are among the highest-yielding strains in regional tests in the south-western states.

Peturson, B. *Losses caused by leaf and stem rust of wheat in Manitoba in 1952.* (pp. 37-41).

The effects of rust infection upon the yield, 1000 kernel weight and bushel weight of Lee, Redman and Thatcher are analysed. For Manitoba as a whole, the combined yield loss due to both rusts was estimated as 5% for Lee and 15% for Redman and Thatcher.

Waldron, L. R. *Breeding for resistance to 15B.* (pp. 41-42).

The results of crosses between Lee and two sibs of Mida, Ns 3175 and Ns 3264, are reported. The sibs possess about the same degree of susceptibility to race 15B of stem rust as Mida. High-yielding, resistant selections have been secured from Lee x Ns 3175.

Smith, G. S. *Progress in breeding for resistance to 15B stem rust.* (pp. 42-43).

In investigations at the North Dakota Agricultural Experiment Station, Kenya 338 has shown most promise as a parent in breeding for resistance to race 15B; it also possesses resistance to leaf rust. Its resistance to 15B is inherited as a dominant character.

Shands, R. G. *Breeding wheat for rust resistance in Wisconsin.* (pp. 44-46).

In spring wheat breeding, selections which exhibited promise with respect to rust resistance and other characters in tests during 1952 include lines from Thatcher x W 38-Hope and Henry x Surpresa, H 306 (Thatcher x a winter derivative

of *T. timopheevi*) and Wis. 250 (Henry x Thatcher-W 38-Ill.1-Hope H 405c-7-1-1-1). Rust resistant selections of Frontana x Thatcher-W 38-Hope and Reward x CI 12632 [(Ill. 1 x Chinese)² x *T. timopheevi*] are ready for yield tests. PI 134704 from Afghanistan was outstanding for straw strength.

In winter wheat breeding, CI 12661 and CI 12662, both from Ill.1-Chinese-*T. timopheevi*-Ped. 2 Turkey x Minturki, have been used extensively as sources of stem rust resistance. In these lines, the association between lateness and resistance was broken. Blackhawk, Shansi CI 12612, D 449 and Hope-Hussar CI 11682 are the main sources of leaf rust resistance now being used.

Ausemus, E. R., Sunderman, D. W., Hsu, K. J. & Smith, D. H. *Progress in breeding for stem and leaf rust resistance in Minnesota.* (pp. 46-49).

In spring wheat improvement, various Kenya wheats and their derivatives and Frontana have formed the chief sources of resistance to stem rust. In an attempt to combine leaf and stem rust resistance, these have been crossed with several leaf-rust resistant wheats, e.g. Timstein, Surpresa, Lee, Klein Titan, and Kenya varieties and derivatives. Promising selections are at various stages of testing.

Combination of stem and leaf rust resistance is also the aim of winter wheat breeding. Winter hardy varieties such as Minturki, Minhardi and Minter or their derivatives have been crossed with the following: Blackhawk; 47BN3345-5 [(Mediterranean-Hope-Tenmarq) x Kenya Sel. RL 1373]; 47AN3489 [(Renacimiento-Clarkan-Kawvale) x (Marquillo-Oro)]; RN3802-43-1 (Oro-Mediterranean-Hope 42); and 3369-61-1-1-6-1 (Wabash-American Banner). To develop winter-hardy wheats with still further improved resistance to leaf and stem rust, a back-crossing programme is being carried out, using Minter, Minturki and Blackhawk as recurrent parents in crosses with the leaf-rust resistant wheats Frontana and Klein Titan and the stem-rust resistant varieties Kenya 58 and Kenya 117A, all four nonrecurrent parents being spring wheats. *Agropyron*-wheat derivatives have also been used as nonrecurrent parents in crosses with Minter.

Campbell, A. B. *Progress in breeding wheat for resistance to stem rust and leaf rust.* (pp. 50-51).

In breeding for stem-rust resistance at the Dominion Laboratory of Cereal Breeding, Winnipeg, RL 2265 (McMurachy x Exchange) has been the chief parent used, its resistance

being derived from McMurachy. This type of resistance, however, breaks down at high temperatures. RL 2520, a line much more resistant to such breakdown, and also with greater resistance to leaf rust, has been developed from Frontana x (RL 2265 x Redman²). RL 2520 has been crossed with Redman, and to a limited extent, with Thatcher and Lee. Using the three last-named wheats as recurrent parents, increasing difficulty has been encountered in maintaining the resistance of the nonrecurrent parent, Kenya 338 AC 2 E 2, to race 15B, although resistance at first appeared to be determined by a single major dominant gene.

Jenkins, B. C. *Progress in breeding wheat for rust resistance at the University of Saskatchewan.* (pp. 51-52).

CA-T lines [(Comet-Apex) x Thatcher] and hybrid selections involving Red Egyptian, Thatcher, Red Bobs, Lee, Chinook, CT 609 (Mida x Cadet) and segregates of (Chinese Spring² x *A. elongatum*) x Redman are showing promise in preliminary and advanced yield tests. With one exception, the hybrids are susceptible to race 15B; the chief area of wheat production in Saskatchewan has however so far remained free from this race.

Dirks, V. A. *Wheat improvement in South Dakota.* (pp. 52-53).

In breeding for resistance to stem rust, a search is being made for wheats with high levels of morphological or physiological tolerance. Some lines exhibiting a very high degree of field resistance possess an unusually large amount of mechanical tissue in the stems. In the progenies of some crosses transgressive segregation for degree of resistance has occurred, suggesting the presence of minor genes, which could be concentrated by breeding. Back-crossing is being carried out to incorporate the Kenya type of resistance to 15B in wheats showing some measure of field tolerance. Surpresa has been employed satisfactorily as a source of resistance to leaf rust. Lines from crosses of Rushmore with Ill.1, Java, Bluestem and Surpresa have shown a relatively low incidence of scab. Resistant hybrid selections are being intercrossed in the hope of securing better scab resistance.

Campos, A., Duarte, E. & Rojas, M. *Sources of resistance to stem rust races 49 and 15B.* (pp. 53-57).

Race 49 became widespread in Mexico during 1952. The results of inoculation tests under greenhouse conditions show that all the Kenya varieties commonly used in breeding, except

Kenya 338 AC 2 E 2, are very susceptible to race 49. McMurachy and Egypt Na 101 are also highly susceptible. Most *T. durum* wheats, Egypt Na 95, the Brazilian varieties Frontana and Rio Negro, the Australian wheats Timstein and Gabo, and commercial varieties of hard red spring wheat such as Newthatch, Thatcher, Mida, Lee and Hope are resistant. Crosses of Kenya varieties resistant to 15B with spring wheats possessing the Hope type of stem rust resistance often provide segregates resistant to both 15B and 49.

Gibler, J. W., Acosta, A. & Vazquez, G. *Reaction of varieties and lines in the 1952 Latin American rust nursery to races 15B and 49 of stem rust in Mexico.* (pp. 58-61).

In the nursery test, the wheats were exposed to a very severe epidemic of 15B, and to infection by race 49 late in the season. Greenhouse tests were also carried out on the reactions of seedlings of the same wheats to race 49. Lists are given of the different categories of resistant varieties and hybrid selections.

Rupert, J. A. *Breeding wheat for rust resistance in Colombia.* (pp. 61-62).

Races 15B and 48 of stem rust have been identified. Parents used in spring wheat breeding, because of their earliness, or resistance to stem, leaf or stripe rust, are indicated. Outstandingly good sources of resistance to stripe rust have been found among Italian, Brazilian and Chilean wheats; Lee and McMurachy are also highly resistant. Many lines from Mentana 2-Kenya C 9906 from Mexico combine resistance to 15B and stripe rust; three are being increased for early distribution.

Johnston, C. O., Heyne, E. G., Schmidt, J. W. & Haskett, W. C. *Progress in breeding hard red winter wheats for resistance to rust in Kansas.* (pp. 62-64).

Hybrids with the Hope type of resistance to stem rust are now in advanced generations; they continue to show a high degree of field resistance, in the absence of 15B. A number of complex hybrid selections highly resistant to 15B are listed. Wheat-*Agropyron* selections, particularly those involving *A. elongatum*, have shown promising resistance to 15B and other races. Breeding for resistance to leaf rust has resulted in Ponca from Kawvale-Marquillo x Kawvale-Tenmarq (cf. PBA, Vol. XXII, Abst. 1096). Most of the hybrids with Hope in their parentage are also resistant to leaf rust, but these have lost some of their resistance to the latter, because of shifts in the predominance of races. Leaf-rust

resistant South American wheats have therefore been used as parents. The most promising material in advanced generations is derived from Frontana x Mediterranean-Hope-Pawnee and Frontana x Marquillo-Oro.

Caldwell, R. M., Compton, L. E., Schafer, J. F. & Patterson, F. L. *Breeding for rust resistance in soft red winter wheats.* (pp. 65-67).

In breeding for leaf-rust resistance at Purdue University, Ind., Chinese (CI 6223), Frondoso and Surpresa have been used for their mature plant resistance. Wabash x American Banner selections, CI 12660 (Warden x Leap), Exchange (Warden x Hybrid English), Aniversario, *A. elongatum* x *T. vulgare*² and Malakof have provided sources of seedling resistance to various races. Composite crosses have been effected to combine seedling and mature plant resistance, Wabash, other resistant selections of Fultz, Hope-Hussar and Hungarian having been widely used.

Promising lines resistant to stem rust have been developed from Hope-Hussar, Frondoso and Surpresa. Recently, Red Egyptian, *A. elongatum* x *T. vulgare*², Kenya K 58, Kenya 338 and derivatives of *T. timopheevi*, McMurachy and Exchange x Redman have been utilized in breeding for stem-rust resistance.

Reitz, L. P. & Johnson, V. A. *Spring wheat for commercial use in Nebraska and for breeding improved varieties of hard red winter wheat.* (pp. 67-69).

In winter wheat breeding in Nebraska spring varieties have been extensively used. Spring wheats exhibiting promising stem rust resistance, according to their field reactions to 15B, 56 and possibly other races, are listed. The F₁ generations of some crosses between Kenya derivatives and winter wheats have shown a semilethal physiological incompatibility. Several winter wheats are also being used as sources of resistance to 15B, e.g. McMurachy-Exchange-Redman³ x Cheyenne, Oro-Mediterranean-Hope x Kenya and Mediterranean-Hope-Tenmarq x Kenya. The difficulties of securing satisfactory winter crosses are stressed.

Atkins, I. M. & McFadden, E. S. *Progress in breeding leaf and stem rust resistant winter wheat varieties for Texas conditions.* (pp. 69-72).

At College Station, southern Texas, crosses between stem-rust resistant Kenya wheats and leaf-rust resistant South American varieties have so far provided the most promising derivatives. Two selections, 32 and 131, of Renacimiento x

Kenya are now being increased for release. Sel. 32 will replace Austin and Supremo in south-central Texas; Sel. 131 will supersede Seabreeze in the extreme south of the state. Both selections are resistant to stem-rust races 11 and 15B and to races of leaf rust now prevalent.

Lists are given of the varieties and hybrids, both susceptible and resistant, used as parents at the Denton Substation, northern Texas, in developing wheats resistant to race 15B of stem rust, and to the leaf-rust race attacking Hope derivatives and important commercial varieties. In *T. durum* breeding, crosses have been made between commercial varieties resistant to race 15B, to produce resistant selections suitable for fodder and winter pasture in south-central Texas.

Schlehuber, A. M. & Young, H. C. (Jun.). *Progress in breeding for leaf rust resistance with Agropyron-wheat hybrids.* (pp. 72-73).

At the Oklahoma Agricultural Experiment Station, a *Triticum* x *A. elongatum* strain has shown resistance to individual races in the seedling stage, and immunity or a high degree of resistance in the field. Wheat-like, leaf-rust immune F₄ lines with fair to good test weights have been secured from Ks. 464708 x Pawnee; they have however certain deficiencies in milling and baking properties, and are to be crossed with wheats having strong flours, such as Comanche and Ponca.

Andrews, J. E. *Breeding for leaf rust resistance in winter wheats in southern Alberta.* (pp. 73-74).

The distribution of rust races in southern Alberta resembles that in the Creston area of southeastern British Columbia; lines developed at Lethbridge are therefore tested for their reaction to leaf rust at Creston. In southern Alberta, however, rust is of less importance than such problems as winter hardiness and resistance to sawfly and bunt. Purdue 3369-61-1-4-1-2-2-1 (Wabash x American Banner) and *T. vulgare* x *A. elongatum* lines have been used as leaf-rust resistant parents.

Heermann, R. M. *Breeding durum wheats for stem rust resistance.* (pp. 74-78).

In breeding for stem-rust resistance in N. Dakota, use has been made of the *T. durum* wheats CI 3255 and PI 94701, and the type of resistance shown by Khapli emmer, the latter type being the more desirable. Two segregates from the cross between Id. 194 x Khapli are

nearly equal to the original Khapli parent in resistance, and have been used as sources of this type of reaction. Ld. 356 (Ld. 308 x Nugget) is being increased, since it may prove suitable as a "stop-gap" to meet the threat of race 15B. Tables are given indicating the seedling and field reactions of 75 resistant *T. durum* varieties tested cooperatively in N. Dakota, Minnesota and Canada during 1952. Some Abyssinian introductions were the most resistant to 15B.

Masson, A. B. *Progress report on breeding durum wheat for resistance to race 15B of stem rust.* (pp. 78-79).

A summary is given of breeding for resistance to race 15B in *T. durum* at the Dominion Laboratory of Cereal Breeding, Winnipeg. RL 1714 [Golden Ball x (Iumillo-Mindum RL 1317)] has been used as one source of resistance. Promising crosses involving other parents include Chapingo RL 1626 x Nugget², CI 3255 (RL 3171 x Ld. 308), PI 94701 (RL 3170 x Nugget), Beloturka (RL 1412) x Nugget and Beloturka x Ld. 308. An attempt is being made to transfer the resistance of McMurachy to *T. durum*.

Cooperative panel. (pp. 79-85).

The discussion dealt with (1) new varieties of winter wheat, *T. durum* and hard red spring wheat being increased, chiefly by stations in the United States, and (2) sources of germ plasm and the cooperative testing of potential parent wheats on an international basis.

McGinnis, R. C. *Species building in wheat and wheat relatives for rust resistance.* (p. 85).

Work in connexion with the transference of genes for rust resistance from related species and genera to *T. vulgare* was initiated at the Dominion Laboratory of Cereal Breeding, Winnipeg, in 1951. Of the 59 amphiploids developed elsewhere, some, having *Ae. ovata*, *Ae. caudata*, *Ae. speltoidea* and *Agropyron obtusiusculum* as one constituent species, have exhibited promising resistance to leaf and stem rust; they are being crossed with Redman. Khapli has been crossed with Redman and H-44; limited tests of the F₃ and selfed back crosses to *T. vulgare* have shown a complete loss of the resistance to race 15B from Khapli.

Unrau, J. *Report of work with aneuploids, chromosome substitutions and species building at the University of Alberta.* (pp. 86-89).

Work on the development of monosomics of

Lemhi and Thatcher is almost complete. Data on the leaf-rust reaction of lines of Chinese Spring with different substituted chromosomes of Thatcher indicate that chromosome X of Chinese Spring is associated with leaf-rust resistance. Probably chromosome X of Thatcher is mainly responsible for the leaf-rust susceptibility of this variety. Information is given on the rust reactions of *Agropyron* and *Aegilops* spp. and of amphiploids of *Triticum* spp. and *Triticum-Aegilops*. The response of the amphiploids is not always that expected from the behaviour of the constituent species: factors for resistance in the species may be inhibited by factors in another species, as in the amphiploids *T. dicoccoides* x *Ae. caudata* and *T. aegilopoides* x *Ae. speltoidea*. In view of such situations, suitable procedures are outlined for making substitution lines of wheat.

An attempt is to be made to obtain crosses of *T. monococcum*, *T. dicoccum* and *T. vulgare* with *Elymus junceus* and *E. caput-medusae*, in the hope of securing new sources of rust resistance.

Burnham, C. R. et al. *Studies on the genetics of rust reaction in wheat, summary of research under R & M project #2213-2.* (pp. 90-91).

Crosses involving normal and monosomic forms of Chinese indicate that the resistance of Frontana to race 56 of stem rust is dominant and due to two duplicate factors, one of which is situated in chromosome VI. The genetics of rust resistance is also being studied in the following by means of monosomics: Lee; Newthatch; II-44-22 (Mida x Kenya 117A; and II-39-2 [Premier x (Bobin²-Gaza)], in which Martinez found several linked genes each governing resistance to a single race of leaf rust (cf. *PBA*, Vol. XXIII, 1088). In Lee, chromosome X has been found to carry two linked factors for resistance to race 56 of stem rust and to several other races.

Shebeski, L. H. *Determination of the number of different gene loci involved in stem rust resistance of the bread wheats.* (pp. 91-92).

Diallel crosses have been made between Kenya 117A, Gabo, Lee, Red Egyptian, Timstein, Egypt NA 95, Thatcher and Marquis at Saskatchewan University, to analyse the genetics of reaction to stem rust. The following four crosses produced only dwarf F₁ plants: Timstein x Marquis, Timstein x Red Egyptian, Gabo x Marquis and Gabo x Red Egyptian.

Knott, D. R. *The transfer of rust resistance to high quality bread wheats from other varieties and species, and the effect of genes for rust resistance on quality.* (pp. 92-94).

In investigations at Saskatchewan University, inheritance of resistance to race 15B of stem rust is being studied in 16 lines, including back crosses of Frontana x Thatcher to Thatcher. An attempt is being made to transfer the rust resistance of Black Persian (*T. persicum*), Golden Ball (*T. durum*) and *T. hermonis* to bread wheats. A wheat-*Agropyron* derivative ($2n = 56$) with three dominant genes for stem-rust resistance has been developed (cf. *PBA*, Vol. XXII, Abst. 1762); it has resistance to race 15B. Back-crossing has been initiated to transfer its rust resistance to five susceptible wheats, representing different levels of quality. After a number of generations of back-crossing, the quality of the reconstituted lines will be compared with that of the recurrent parents.

Jenkins, B. C. *Location in specific chromosomes of genes responsible for rust resistance.* (pp. 94-95).

The chromosomes carrying genes for rust resistance are being determined by means of 21 aneuploids of Chinese Spring. In this connexion, crosses involving Chinese Spring² x *A. elongatum* (cf. *PBA*, Vol. XXII, Abst. 1762), Gabo and Eglypt NA 95 are under investigation.

Suneson, C. A. *Rust research at Davis, California.* (p. 95).

In wheat breeding for stem-rust resistance, Hope, Kenya (FPI 117526), Eureka, Gabo, CI 12633 (*T. timopheevi* derivative) and *Agropyron* derivatives are being used as sources of resistance.

Schmidt, J. W., Heyne, E. G., McCracken, E., Johnston, C. O. & Haskett, W. C. *Wheat genetic and cytogenetic research at Kansas State College.* (pp. 96-97).

The genetics of the leaf rust reactions of the eight differential wheats for this rust is being analysed. Democrat and Mediterranean contain the same genes for resistance to race 9 and susceptibility to race 15 and 58. In the hybrid Malakof x Democrat, two recessive factors govern the resistance of Democrat to race 9, and one dominant factor determines the resistance of Malakof to race 15 and 58.

Data from Timstein x Pawnee and Timstein x Red Chief suggest that Timstein has one major recessive and one or more modifiers for seedling and adult plant resistance to races 5, 9, 15, 44 and 126. Pawnee possesses one major factor for

seedling resistance to race 9, partially epistatic to the main gene in Timstein but linked with it.

Crosses of Chinese² x *Agropyron elongatum* (cf. *PBA*, Vol. XXII, Abst. 1762) with Pawnee substantiate the hypothesis that the stem-rust resistance of the former depends upon three dominant genes.

Meiotic instability in the South American variety Sinvalocho and its hybrids with Pawnee is being studied. Cytological investigations are being carried out on advanced line-bred *Triticum-Agropyron* strains for evaluating them as parents.

Sears, E. R. *Studies of genes in wheat and related species.* (pp. 97-98).

In Timstein, two genes on chromosome X are apparently responsible for the whole of this variety's resistance to stem rust. Red Egyptian possesses a gene on XX and at least one gene on VI, each more or less effective against nearly all races, and interacting with each other to give increased resistance to certain races. Hope has a gene on VIII, responsible for resistance to races 17, 19 and 38, and another gene not yet located, providing resistance to the other races used in testing (11, 36 and 56). Thatcher carries a gene on XIX, conferring resistance to races 17, 19 and 59, and a gene not yet located giving resistance to races 11, 36, 38 and 56.

Chromosome X from Timstein is being combined with VIII from Hope, XIX from Thatcher, and VI and XX from Red Egyptian. The effects of triple and quadruple doses of each of these five chromosomes are also being analysed.

An attempt is being made to transfer the leaf-rust resistance of *Ae. umbellulata* to *T. vulgare*. The *Aegilops* chromosome carrying the gene for resistance was first added to the full complement of wheat chromosomes. By means of X rays, four substitutions of the required *Aegilops* segment for a piece of wheat chromosome have been secured, but in none have the deleterious genes been eliminated. All four apparently involve almost an entire arm of the *Aegilops* chromosome, the gene for resistance evidently being situated proximally on this arm. If the deficiency of wheat chromatin involved in any particular substitution proves to be without deleterious effect when homozygous, further irradiation can presumably be used to break off the unwanted portion of the *Aegilops* segment.

Larson, R. I. & MacDonald, M. D. *Cytogenetic studies of stem solidness in wheat.* (pp. 98-99).

At the Field Crop Laboratory, Lethbridge,

Alba., S-615 (*T. vulgare*), Golden Ball and *Ae. sharonensis* ($2n = 14$) are being studied as sources of stem solidity. In unfavourable environments S-615 becomes hollow in the top two internodes, whereas Golden Ball, although more stable, tends to become hollow at the base. Attempts to transfer the stem solidity of Golden Ball to hollow-stemmed varieties of *T. vulgare* have failed, but F_2 lines of Rescue x Golden Ball with stems more solid than those of Rescue (cf. *PBA*, Vol. XVI, Abst. 1053) have been secured; the pattern of pith distribution is however typical of *T. vulgare*. The amphidiploid Golden Ball x *Ae. squarrosa* is less solid-stemmed than S-615, and has the pith pattern of *T. vulgare*, indicating the effect of the D genome. Aneuploid analysis has revealed that genes inhibiting pith formation are responsible for hollow stems (cf. *PBA*, Vol. XXIII, Abst. 1066). Although *T. dicoccoides* is thick-walled and hollow, and *Ae. sharonensis* has only a small amount of pith, their amphidiploid has a fairly solid stem, which is largely dominant in a cross with Apex (*T. vulgare*). Only three of the chromosomes of *Ae. sharonensis* appear to have much homology with the D genome of *T. vulgare*. The amphidiploid of Red Bobs (*T. vulgare*) x *Ae. sharonensis* is to be back-crossed to Red Bobs until seven lines, each with the addition of a different chromosome of *Ae. sharonensis*, are produced; the lines are to be studied with respect to morphological characters, stem solidity and resistance to powdery mildew and race 15B of stem rust.

McFadden, E. S. *Gleanings from studies of the McFadden-Sears allohexaploids.* (p. 99).

According to the behaviour of allohexaploids involving *Aegilops squarrosa* and the rust-resistant tetraploid wheats (cf. *PBA*, Vol. XVIII, Abst. 829) under field conditions, the C genome has a diluting effect upon the genes for rust resistance. The allohexaploids *T. dicoccoides* x *Ae. speltoides*, and *T. timopheevi* x *Ae. speltoides*, and some of the free-threshing selections from the back cross of *T. dicoccoides* x *Ae. speltoides* with Austin are highly resistant to races 11 and 15B of stem rust in the field; these selections have however certain undesirable characters of *Ae. speltoides*, and some carry extra chromosomes or fragments. Their F_1 hybrids with *T. vulgare* are, nevertheless, highly fertile.

Peterson, R. F. & Campbell, A. B. *Aneuploid analyses of the genes for stem rust resistance and head density in McMurachy wheat.* (pp. 99-100).

Data from the cross between McMurachy and

the Chinese Spring monosomic for chromosome XX have indicated that the main gene for stem-rust resistance in McMurachy is situated on this chromosome. The major gene for head density in McMurachy is also located on XX.

Goulden, C. H. *Observations on wheat breeding in South America.* (pp. 107-08).

Some information is given on the location and aims of wheat breeding in several countries of South America.

Borlaug, N. E. & Castillo, F. *Resistance to lodging and shattering and early maturity as important considerations in Mexican breeding program.* (pp. 108-10).

In wheat breeding in Sonora, Timstein, Gabo and Marroquí have been especially valuable in improving resistance to lodging. In breeding for resistance to shattering, crosses have been made to combine strong glumes and strong rachis. The hybrids (Aguilera x Kenya 324) x (Marroquí x Supremo) and Kenya 324 x General Urquiza show the best combination of these characters, and are being used as parents. Wheats found to be the best sources of earliness are listed; this character is required to reduce the need for irrigation, and for cultivating wheat above 6000 ft. during the rainy season.

Shebeski, L. H. *Spring frost resistance.* (pp. 110-12).

A description is given of the method used at the Field Husbandry Department, Saskatchewan University, for testing cereal varieties for spring frost resistance by means of temperature-controlled chambers.

Harrington, J. B. *Resistance to after-harvest sprouting.* (pp. 112-13).

In tests at Saskatchewan University during 1952, five Comet-Apex-Thatcher lines showed the longest dormancy; most varieties were intermediate in duration of dormancy. Improved procedures of testing are being devised, since sprouting in the stook may cause bad losses in yield.

Goulden, C. H. *Design techniques and testing.* (pp. 113-14).

In cereal breeding, characters with a high efficiency of selection should be selected for in the F_2 and F_3 , keeping the hybrid population on a single-plant basis involving large numbers. Characters with low efficiency, such as yield and quality, should be selected for only after homozygous lines have been produced. The

first tests of yield and quality should be of a preliminary nature and on a large number of units; as the number of units is reduced, the number of replications and plot size can be increased until a regular rod-row test is reached. In order to produce a large number of homozygous lines, use of growth chambers making possible the production of four or five generations per year is advocated.

Masson, A. B. *Preliminary seed processing.* (pp. 114-15).

An outline is given of the procedures used in Canada for cereals in the production of foundation stock, subsequent multiplication, and distribution of seed to farmers.

Grant, M. N. *Sawfly research.* (pp. 115-16).

Solid-stemmed varieties of *T. vulgare*, particularly S-615, have been used in breeding for sawfly resistance in Canada (cf. *PBA*, Vol. XVI, Abst. 1053). Solid-stemmed *T. durum* wheats and lines of *A. elongatum* are now also being utilized.

Farstad, C. W. *Wheat stem sawfly.* (pp. 116-18).

It has been found in Canada that wheats with apparently equal degrees of stem solidity differ in grade of sawfly resistance. Stem solidity may be reduced under certain environmental conditions, as in the eastern part of the Great Plains. Evidence of sawfly races has been secured. Sawfly progeny from different wheat varieties differ significantly in sex ratio; female sawflies vary significantly in both total length and oviposition potential according to the host variety (cf. *PBA*, Vol. XXII, 2628).

McNeal, F. H. *Cooperative sawfly project in Montana.* (pp. 118-20).

No difficulty has been encountered in recovering the stem solidity of Rescue; some difficulty has however been found in obtaining selections with early maturity and satisfactory quality. Of the more advanced lines, B 49-90 [N 1764 (Pilot x Merit) x Rescue] and B 50-18 (Rescue x Thatcher) show the most promise with respect to both agronomic characters and quality. Ten resistant Portuguese wheats have been crossed with Lee, Thatcher and Rescue. The latter variety has also been used as a source of sawfly resistance in winter wheat breeding. In advanced material of Yogo x Rescue, the stem solidity of Rescue has been recovered but the winter hardiness of Yogo may not have been maintained.

Heermann, R. M. *Breeding wheat for the sawfly area in North Dakota.* (pp. 120-21).

In recent tests, CI 6060, CI 11702 and PI 170924 have shown sawfly resistance. The first three are solid-stemmed, and approximately equal to Rescue in resistance; as in the case of Rescue, their solidity and corresponding resistance are environmentally influenced. PI 170924 is a late-maturing, hollow-stemmed variety from Africa, giving a low survival rate of the larvae. Nearly 20 *T. durum* wheats have exhibited promising resistance. Crosses of Ceres, Thatcher, N 1764, N 1850, N 2157 and Mida with Rescue are at an advanced stage; the material may provide a variety equal to Rescue in sawfly resistance and comparable to Thatcher or Mida in yield and quality, but no line will be resistant to leaf or stem-rust. Lee, N 2211, Ns. 3654 and Ns. 3681 have been crossed with Rescue and Chinook, to combine resistance to leaf rust and sawfly.

Larson, R. I. *Report of the special section on genetics, aneuploids, and species building in wheat.* (pp. 121-22).

Aneuploid analysis, chiefly using monosomics and nullisomics, has so far located eight genes for stem rust resistance on six different chromosomes, and one gene for leaf rust resistance. Monosomics, now available for chromosomes of Chinese Spring, are being produced in at least ten other varieties of different types. Desirable genes for rust resistance may be transferred to wheat by crossing-over in amphidiploids, or when this does not occur, resort to the addition or substitution of the critical chromosome, with or without subsequent irradiation, is possible.

Ledingham, C. A. *Report of special section on physiology of parasitism of rusts.* (p. 123).

Projects have recently been initiated in several laboratories in both the United States and Canada to investigate physiological and biochemical problems of the rusts and their hosts.

254 GUYOT, L. & MASSENOT.

A propos de la race 40 de *Puccinia graminis tritici* (Rouille noire du blé). [On race 40 of *P. graminis* var. *tritici* (Black rust of wheat)].

CR Acad. Agric. Fr. 1953 : 39 : p. 499.

Strain 40 of black rust was found in Montpellier in 1951. Tests showed the varieties Cabezan de Goni, Einkorn 2433, Khrelaf 2347, Klein Ottowulf, MacMurachy RL 1313, Newthatch 12318, Red Egyptian, Rieti II, RL 2325, RL 2564, Timstein, the Kenya varieties and the

Gabo varieties to be comparatively resistant to it. The variety Thatcher proved immune.

255 JONES, G. L.

Inheritance of the mode of reaction to stem rust, particularly race 15B, and leaf rust in two crosses of vulgare wheats.

Diss. Abstr. 1953 : 13 : Publ. No. 4861 : 156-57.

Investigations were made of the inheritance of resistance to certain stem-rust races, notably 15 B. Seedling resistance to 15 B was shown to be dependent upon three separate genes in both the crosses employed, II-44-22 (Mida x Kenya 117 A) x Frontana and II-44-29 (Kenya 58 x Newthatch) x Frontana, but there were different gene interactions in each cross.

Seedling resistance to each of the other races of stem rust 11, 17, 36, 38 and 56 and to the races of leaf rust 5 and 15 appeared to be simply inherited. The leaf rust resistance of Frontana can be combined with both seedling and field resistance to certain races of stem rust.

256 MARTINEZ, L. M., AUSEMUS, E. R. & BURNHAM, C. R.

Inheritance of reaction of leaf rust, *Puccinia rubigo-vera tritici* (Erikss.) Carleton, and of certain other characters in a wheat cross.

Tech. Bull. Minn. Agric. Exp. Sta. 1953 : No. 205 : Pp. 35.

The genetics of reaction to leaf rust infection in wheat was studied in the F_1 , F_2 and F_3 progeny of a cross between the susceptible variety Thatcher and the partially resistant selection NS 11-39-2, derived from Premier x Gaza-Bobin-Gaza.

Six different genetic factors, one for each race, determined seedling reaction to races 1, 2, 5, 15, 28 and 128a. Susceptibility is dominant. The positive correlation between reaction to the different races is high, suggesting linkage.

Mature plant reaction to a mixture of leaf-rust races in the field is due to the action of three genetic factor pairs independently inherited. Any factor in the dominant condition results in susceptibility.

257 HANSON, E. W. & CHRISTENSEN, J. J.
The black point disease of wheat in the United States.

Tech. Bull. Minn. Agric. Exp. Sta. 1953 : No. 206 : Pp. 30.

The relative susceptibility was tested of different varieties of wheat to kernel smudge, a disease

believed to be due to either *Alternaria* or *Helminthosporium*. In general, the *Triticum durum* wheats were considerably more susceptible than the *T. vulgare* wheats. Marquis, Ceres and Regent were the most resistant varieties.

258 SHANDS, R. G. & CARTWRIGHT, W. B.
A fifth gene conditioning hessian fly response in common wheat.

Agron. J. 1953 : 45 : 302-07.

Data are reported showing that Ribeiro, PI 94549-6 and PI 94571-14 each possess an incompletely dominant pair of genes, designated H_5H_5 , for resistance to Hessian flies native to Indiana. Thatcher, Sel. 6179 and Sel. 6232 are homozygous recessives for this gene pair. In the crosses and back crosses of the three first-mentioned varieties with Thatcher, inheritance of reaction to Hessian fly was independent of the awnless *vs.* the awned condition and of response to stem rust.

259 JONES, E. T., HEYNE, E. G. & SCHMIDT, J. W.

A new source of wheat jointworm resistance in wheat.

Trans. Kans. Acad. Sci. 1952 : 55 : 427-30.

Tests over a number of years failed to discover wheat varieties resistant to *Harmolita tritici*. Resistance was found however in some strains of *Agroticum* (*Agropyron* x *Triticum*) and in some wheat-rye x wheat hybrids, and it is suggested that transference of both jointworm and rust resistance from *Agropyron* and rye to wheat varieties can be effected.

260 **Forty-fifth Annual Report of the Norfolk Agricultural Station, 1952-53 (1953) : Pp. 14.**

Based on the results of variety trials over a three year period, recommendations are made as to the latest dates on which different varieties of winter wheat may be sown. Various wheat varieties are also compared as to quality.

261 WALKER, A. J. K.
Results of wheat variety trials in South Australia.

J. Dep. Agric. S. Aust. 1953 : 56 : 479-92.

The results of five years' variety trials, conducted at ten different centres in Southern Australia, are given, and notes included on the varieties tested. Insignia 49 was outstanding in yield and showed good resistance to stem rust and lodging. The varieties Dirk 48, Scimitar 48, Javelin 48, Sabre and Panther also did well.

BUCKWHEAT

262 MURAKAMI, K.

Study on the physiology of artificial polyploid. I. The mode of change in total nitrogen and sugar contents in the process of growth of tetraploid buckwheat, *Fagopyrum esculentum* Moench.

Tohoku J. Agric. Res. 1953 : 3 : 219-27.

A comparison between colchicine-induced tetraploids and the original diploid has shown that $4x$ seeds have a higher total nitrogen content than $2x$ seeds. Before flowering, when the growth rate of $4x$ plants was less than that of $2x$ plants, the former contained less nitrogen than the latter. During flowering, differences in nitrogen content were insignificant, but as maturity was reached the $4x$ plants showed a higher growth rate than $2x$ plants and contained more nitrogen than the latter. Differences in the sugar content were also noted, but these showed no connexion with growth rates.

The relative slowness of germination of $4x$ seeds is thought to be associated with the seed coats, which are thicker than those of the diploids.

OATS

263 MURPHY, H. C.

Registration of oat varieties, XVII.

Agron. J. 1953 : 45 : 324-25.

The varieties Mo. 0-205 (cf. *PBA*, Vol. XXII, Abst. 314) and Mo. 0-200 (cf. *PBA*, Vol. XXIII, 2607), registered in 1952 in the United States, are described.

264 KUDRJAVEVA, N. N.

(New standard varieties of oats).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : p. 67. [Russian].

Nadežnyi [Reliable], a new standard for the Minsk province, is more productive and 5 days earlier than Soviet. It shows resistance to lodging and shedding, but is susceptible to rust. The 1000 kernel weight is 31 g. It has a low chaff content. Iygeva Hjamarik, a new standard for Estonia, was bred from Strube von Schlanstedt x Kehra Tangu. It is more productive than Iygeva Agu and shows resistance to rust and lodging. The 1000 kernel weight is 34 g. and the chaff content low.

265 BRUN, L. H.

Forsøk med havresorter 1945-1950. **(Experiments with oat varieties 1945-1950).**

Forskn. Fors. Landbr. 1953 : 4 : 233-78.

In continuation of previous studies (cf. *PBA*, Vol. XX, Abst. 252) a detailed report is given

of the performance of 26 Norwegian, Swedish and Finnish varieties of oats in trials at the Voll Experimental Station and in other localities in Norway. Yield and quality of grain, strength of straw, lodging, earliness, and reliability as regards productivity are recorded.

Recommendations for the experimental localities which varied greatly in climate, include Nidar II, Hein II, N x G 250/42, Ymer, Bambu, Kytö, Strind, Rygja and Gullregn II [Golden Rain II]: N x G 250/42, a sister variety of Nidar II, is a pure line from Nidar x Grenader [Grenadier] and will be called Voll.

The genetic origin of some of the varieties tested is shown in a classification according to earliness. In the case of some varieties, the possibility of the existence of correlations between qualitative characteristics was examined.

266 FREY, K. J.

The effect of cost functions on number of replications and samples per plot in field plot experiments of oats.

Agron. J. 1953 : 45 : 265-67.

An analysis of data from six field experiments at East Lansing, Mich., using Smith's empirical formula for determining optimum plot size (cf. *PBA*, Vol. VIII, Abst. 1011), showed that the cost per plot was approximately three times the cost per sample, and the average regression coefficient for Smith's formula was 0.744. In order to maintain a degree of precision such that the standard error of difference between two varieties was equal to 6% of the general mean, with a minimum cost per variety, the optimum number of replications per variety and number of samples per plot should be four and five, respectively.

267 SAPPENFIELD, WM. P. & POEHLMAN, J. M.

Effect of date of seeding on the yield and test-weight of oat varieties.

Res. Bull. Mo. Agric. Exp. Sta. 1952 : No. 499 : Pp. 16.

Tests were carried out at three centres in Missouri to study the effects of date of sowing on the yield and test weight of varieties belonging to different maturity groups. The results emphasized the importance of both early maturity and early sowing in the production of maximum yields, even in the case of rust-resistant varieties.

268 ROGERS, J. A.

Victorgrain 48-93—record producer in the south.

Sth. Seedsman 1953 : 16 : No. 9 : p. 15.

The oat variety Victorgrain 48-93 is described

as having ranked highest in yield of all commercially available varieties in a large number of trials throughout the southern United States. Derived in 1945 from a single head selection of the original Victorgrain variety, it is highly resistant to lodging and matures early. It was immune until very recently to all known races of crown rust, displaying marked resistance also to the new races identified, and shows considerable field tolerance of *Helminthosporium*.

- 269 ROSEN, H. R., WISER, W. J. & YORK, J. O.

Arkwin, a disease-resistant oat and comparisons of small grains as winter forage.

Bull. Arkans. Agric. Exp. Sta. 1953 : No. 533 : Pp. 31.

Further data are presented on the oat variety Arkwin (cf. *PBA*, Vol. XXII, Abst. 1118), together with particulars of its ancestry and genetics of resistance to crown rust. It appears to combine one of the widest ranges of disease resistance yet known, including resistance to almost all common races of crown rust and current races of smut; partial resistance to race 7 of stem rust; high resistance to *Helminthosporium* blight; probably resistance to *Helminthosporium* leaf spot and anthracnose; and high resistance to virus diseases. It is also drought and frost resistant.

- 270 **Varieties of winter oats and winter barleys.**

Fmrs' Leaflet. Nat. Inst. Agric. Bot. 1953 : No. 9 : Pp. 3.

Data are presented on varieties recommended for sowing in 1953. Picton, S 147 and S 172 comprise the oats, with the addition of the stem-eelworm resistant S 81, which is to be withdrawn from the recommended list in 1954, and Grey Winter, which is regarded as having a strictly limited use, its winter hardiness and high resistance to stem eelworm being offset by low yield and tendency to lodge.

Pioneer and Prefect are the barleys listed. The latter is to be withdrawn in 1954.

- 271 POOLE, D. D. & MURPHY, H. C.
Field reaction of oat varieties to *Septoria* black stem.

Agron. J. 1953 : 45 : 369-70.

The reactions of different oat varieties to infection by *Leptosphaeria avenaria* were studied. No variety was immune, but Clinton, Branch, Mo. 0-200, Shelby, Colo and Richard were moderately resistant. At eight of the ten centres used for the trials, a negative correlation

between the amount of black stem and grain yield was observed, but in only one instance was this significant. At only one centre did infection reduce resistance to lodging.

- 272 GRIFFITHS, D. J.
Varietal resistance and susceptibility of oats to crown rust.

Plant Path. 1953 : 2 : 73-77.

Of 40 varieties and selections of oats tested, 31, including all the more important commercial strains grown in the United Kingdom, showed pronounced susceptibility to each of the 8 physiological races of *Puccinia coronata* isolated. Landhafer proved resistant to all 8 cultures, Victoria and Tama to all but one, and Bond, Clinton, Eaton and Shelby to 6 of the 8. Apart from Landhafer all the varieties resistant to crown rust proved extremely susceptible to mildew. Thus Landhafer is the most suitable parent for hybridization in breeding new resistant varieties.

- 273 REITZ, L. P.
New oat varieties... and how to grow them.

Neb. Exp. Sta. Quart. 1952-53 : 1 : No. 3 : 10-11.

Details are given of Missouri 0-205, a new early-maturing variety of oat giving a high yield of good quality grain and possessing stiff straw. A selection from a cross between Columbia and Victoria-Richland, the new variety is resistant to blight, race 7 of stem rust, smut and crown rust. Seed is now available in quantity.

Particulars are also given of three other new varieties at present undergoing trials, Clintland, Clintafe and LaSalle.

- 274 IVANOFF, S. S.
Breeding oats for resistance to diseases and cold.

Phytopathology 1953 : 43 : p. 291. (Abst.).

Some progress has been made in breeding for combined resistance to crown rust, Victoria blight and cold in the southern United States. Landhafer and Santa Fe have formed the chief sources of crown-rust resistance. Strain CI 5930 (Victorgrain x Landhafer) is undergoing a regional test in the Gulf Coast area, but it is not high in cold resistance. By means of mass-screening methods in the laboratory, a few disease-resistant seedlings have been isolated from several million susceptible seeds of varieties derived from Victoria hybrids.

- 275 KAUTER, A. & MÄRKI, H.
Die Eignung verschiedener Getreidearten als Ackerfuttergemenge. (**The suitability of different cereals as mixed fodder crops**).
Schweiz. landw. Z. 1953 : 81 : 790-99.

MÄRKI, H.

Welche Getreidearten eignen sich am besten für Ackerfuttergemenge? (**Which cereals are best suited for mixed fodder crops?**)

Mitt. schweiz. Landw. 1953 : 1 : 108-11.

Of the oat varieties tested, Flämingsgold, Flämingsstreu and Soldanella were least susceptible to attack by frit fly.

276 Oat variety trials.

Mon. Rep. Minist. Agric. N. Ire. 1953 : 28 : 173-75.

The results of recent trials carried out at several centres in N. Ireland are summarized. In trials on good lowland soils, Glasnevin Triumph, Steel and, since its introduction in 1950, Abed Minor, have given the highest yields of grain during the inclusive period 1949-52. Glasnevin Triumph, however, tends to lodge. In the 1952 tests on poorer soils at higher altitudes Stormont Kern maintained its superiority in both grain and straw production.

277 BUCHLI, M.

Die Hafersorten des schweizerischen Richtsortimentes für den Getreidebau 1953. (**Oat varieties of the Swiss approved assortment for cereal cultivation 1953**).

Mitt. schweiz. Landw. 1953 : 1 : 103-08.

The oat varieties recommended by the Swiss seed association and Federal agricultural experimental stations at Zürich-Oerlikon and Lausanne for cultivation in 1953 are described.

RYE

278 Rye.

Fmrs' Leaflet. Nat. Inst. Agric. Bot. 1953 : No. 12 : Pp. 2.

Data are presented on British and foreign varieties of winter and spring rye. Continental varieties of winter rye are more resistant to lodging and produce higher yields than British varieties.

279 New fall rye variety Antelope is developed.

Canad. Grain J. 1953 : 8 : No. 11 : p. 22.

A new variety of autumn rye, Antelope, has been announced. It excels Dakold, the leading variety in Western Canada, in yield, resistance to frost and the attractiveness of its grain.

280 NAKAJIMA, G.

[**Cytogenetical studies of intergeneric hybrids between *Haynaldia* and *Secale*. II. External characters and meiosis in the pollen mother cells of the backcross hybrid (*H. villosa* x *S. cereale* F₁) x *S. cereale* F₁].**

Idengaku Zasshi/Jap. J. Genet. 1953 : 28 : 19-27. [Japanese].

Twelve sterile individuals resulted from the above back cross. Morphologically, they most resembled rye. The chromosome number was $2n = 20$ or 21 , with 0-8 bivalents and rare multiple configurations. In the case of the 20-chromosome hybrids, allosyndetic pairing occasionally occurred between single chromosomes from the R and V genomes, respectively.

281 OINUMA, T.

(**Nuclear morphology of the cereals. II. On caryotype alteration in rye**).

Idengaku Zasshi/Jap. J. Genet. 1953 : 28 : 28-34. [Japanese].

Studies on chromosome morphology are reported for a series of European and oriental varieties. Each of the 7 chromosome pairs are distinguishable from each other, but only two pairs, a and d, differed between the varieties studied. Three forms of the a chromosome were noted and two of the d chromosome. The most primitive type is believed to be the a_1d_1 combination, exemplified by the strain Greenland Original.

282 OINUMA, T.

(**Nuclear morphology of the cereals. III. Caryomorphological studies on the origin of 8- and 9-chromosome rye**).

Idengaku Zasshi/Jap. J. Genet. 1953 : 28 : 57-62. [Japanese].

Further to his studies on the morphology of rye chromosomes (cf. Abst. 281), the author investigated two Korean ryes with supernumerary chromosomes. One of these, with $2n = 16$ chromosomes, was of the a_2d_1 type with the addition of a pair of fragments. The other, in which $2n = 18$, had the pair of fragments and two pairs of a_2 chromosomes.

283 Ross, C.

(**New lodge-defying tetraploid**).

Sth. Seedsman 1953 : 16 : No. 9 : 16-17, 72.

The results of trials of the colchicine-induced tetraploid Petkus rye introduced into the USA from Germany are given. It produces an extremely high yield, is resistant to lodging and drought and thrives on a wide range of soils.

- 284 KLJUČAREVA, M. V.
(Pollinating rye with the pollen of unrelated species).
 Agrobiologija (Agrobiology) 1953 : No. 2 : 34-35. [Russian].

At the USSR Genetics Institute, rye was pollinated with the pollen of various unrelated species. Pollen growth was stimulated by adding to it whole stigmas or portions of anthers of the species providing the pollen. Large but underdeveloped grains of the rye type were obtained as a result of pollinations with the pollen of various plants, but only five of these developed normally to reach the tillering stage. These grains were borne on rye pollinated with tomato (one), radish (one) and pea (three). All these plants had 14 chromosomes. The experiments suggest that no fusion between the reproductive cells of rye and the pollen-bearing species had occurred, and that some qualitative changes produced in the ovary were responsible for growth and development of the new organisms.

MAIZE

- 285 DE PRETER, E.
 De veredeling van de maïs te Gandajika.
(Maize breeding at Gandajika).
 Bull. Inform. INEAC 1953 : 2 : 93-114.

An illustrated account is given of the way in which modern methods of selection and breeding are applied to maize at the Gandajika Experimental Station in the Belgian Congo.

- 286 SCHWARTZ, D.
Evidence for sister-strand crossing over in maize.
 Genetics 1953 : 38 : 251-60.

An unexpectedly high frequency of single bridges at anaphase II in plants possessing a large ring involving chromosome 6 and its homologous rod chromosome is ascribed to sister-strand crossing-over between the two types of chromosome. At least one sister-strand cross-over occurred per bivalent. It is suggested that Matsuura's hypothesis of the parallelization of the spiral system at late metaphase I (cf. *PBA*, Vol. XXI, Abst. 1551) could account for sister-strand crossing-over, if it is assumed that the paired chromatids in each bivalent are sister strands. This hypothesis would also explain the low rate of sister-strand crossing-over in mitosis, since in somatic mitosis, each of the chromatids of a chromosome usually has an independent spiral system from the beginning of its development.

- 287 IBRAHIM, M. A-E.
Association tests between chromosomal interchanges in maize and resistance to the European corn borer.
 Diss. Abstr. 1953 : 13 : Publ. No. 4858 : 285-86.

The susceptible line A 344 was crossed with the resistant line A 411 to determine which chromosomes carry the genetic factors responsible for resistance to the European corn borer. Resistance was found to be due to at least one gene in the long arm of chromosome 3, and one gene in the long arm of chromosome 4. The evidence is fairly conclusive for the existence of another in the long arm of chromosome 5.

- 288 **Report of the sixth FAO Hybrid Maize Meeting, Lisbon, Portugal, 9-14 February, 1953.**
 FAO, UN, Rome 1953 : Pp. 57. (Mimeographed).

The reports of the southern and northern regional committees give the methods and policies agreed upon for cooperative tests of inbred lines of European and Mediterranean origin. Minimum seed certification standards for maize in European and Mediterranean countries were established. M. T. Jenkins discussed the breeding and other problems facing the expanded use of hybrid maize in Europe and the Middle East, dividing the regions concerned into three categories: northern flint areas; regions suited to the use of American hybrids; and the dry upland areas of Mediterranean countries. R. W. Jugenheimer suggested various ways in which the development and use of hybrid maize may be accelerated. R. A. Silow reviewed the progress already achieved in the commercial utilization of hybrids in Europe and the Mediterranean region. F. P. Ferwerda gave a survey of methods to ensure synchronization of flowering time in inbred or single-cross parents, describing the results of Dutch experiments. C. Schad outlined the organization of seed production of varieties and hybrids in France. W. R. Becker considered spacing and population studies, with particular reference to work in the Netherlands. L. Fenaroli gave an account of the chief pests and diseases of maize in Italy.

- 289 **La culture du maïs hybride en France. (The cultivation of hybrid maize in France).**
 Actualités Agron. 1951 : Sér. B : No. 1 : Pp. 144.

Bustarret, J. *Introduction. (Introduction).* (pp. 9-13).

Heterosis, American maize hybrids, earliness,

spacing and cultural measures are discussed as part of the programme to intensify hybrid maize production in France.

Alabouvette, L. Amélioration de la culture du maïs et problème du choix des variétés. (The improvement of maize cultivation and the problem of the choice of varieties. (pp. 15-19).

Factors of importance in choosing hybrid maize varieties for growing in France include: resistance to lodging; suitability for machine harvesting and drought resistance.

Alabouvette, L., Bertin, P., Dumail, J., Piat, J. & Rautou, S. Conditions de la culture du maïs et expérimentation des variétés destinées à la production du grain. (Conditions of maize cultivation and testing of varieties intended for grain production). (pp. 21-41).

On the basis of results of trials begun in 1947, the suitability of French varieties of maize for various geographical regions of France is discussed.

Tables are given showing the performance of large numbers of French varieties as compared with American hybrids in Languedoc, the Basque country, the Toulouse district and other regions (cf. *PBA*, Vol. XXI, Abst. 320 and Vol. XXIII, Abst. 1128).

Schad, C. & Villax, E. La production du maïs grain dans la région du Centre. (The production of maize for grain in the region of the Centre). (pp. 43-51).

This is a further report (cf. *PBA*, Vol. XXI, Abst. 325) on maize trials in Limagne and other regions of the Centre to determine (1) the degree of earliness best suited to the area, and (2) which hybrids and open-pollinated varieties give good and regular yields.

The open-pollinated variety Blanc de Chalosse is mentioned for its drought resistance. Among the recommended hybrids are: Nodak 203 and 301; Wisconsin 240 and 255; U 20 and 22; and, for the hotter belts, Minhybrid 706 and Pride B 23.

Méneret, G. Quelques aspects de la culture du maïs-grain en Bresse. (Some aspects of the cultivation of maize for grain in the Bresse region). (pp. 53-67).

Trials in which American maize hybrids were compared with local out-pollinated French varieties were continued during 1948-50 (cf. *PBA*, Vol. XXI, Abst. 296).

Though, with certain spacings, no significant difference in yield was found between Wisconsin

255 and the local maize, in general Wisconsin 255 was not only more resistant to drought and lodging, but also ripened more evenly and earlier and could be ground soon after harvesting. The tendency to form two ears per stem appeared in the hybrid as soon as the plant spacing exceeded 0.31 m., but not in the local maize until the spacing had reached 0.62 m.

Laremborgue, R. de. Essais de maïs hybrides américains en Alsace. (Trials of American hybrid maizes in Alsace). (pp. 69-72).

In 1949 and 1950 a number of American hybrids were compared with the local Alsatian varieties Jaune d'Alsace [Yellow Alsace] and Jaune de Bade [Yellow Baden]. From the results, United 22 and Wisconsin 255, and possibly Wisconsin 240, could be recommended for grain production in Alsace.

Cauderon, A. Essais de culture de maïs-grain dans la région parisienne. (Cultivation trials of maize for grain in the Paris region). (pp. 78-82).

Factors affecting yield are discussed and the performance of ten American hybrids and four European populations in comparative trials is recorded (cf. *PBA*, Vol. XXI, Abst. 321), with special reference to adaptation to the Paris region. When there was no difference in earliness the hybrids were superior to the populations in yield.

Diehl, R. Quelques aspects de la culture du maïs-grain dans la Région Ouest. (Some aspects of the cultivation of maize for grain in the Western Region). (pp. 83-86).

Trials in France have shown that, north of the Loire, the varieties W 255, U 20 and U 22 differ little in performance, though the slightly later U 22 is not so constant in yield as the other two. Jaune de Bade was surpassed by the American hybrids. South of the Loire, the later variety W 355 slightly surpassed Grand Roux Basque in the Charente-Maritime district, though the difference was not significant.

Hédin, L. Le maïs en Normandie. (Maize in Normandy). (pp. 87-92).

Trials of local and other French varieties as well as American hybrids have shown that only very early varieties are suitable for growing as a grain crop in Normandy.

From comparative tests of forage types, early French varieties like Roux des Landes seem superior to the later maturing American varieties.

Diehl, R. *Essais de maïs fourrage dans l'Ouest. (Trials of forage maize in the West Region).* (pp. 113-17).

Trials in France with American hybrid maize and French varieties indicated that, when the varieties compared were equally early and harvesting took place when the male inflorescence was in flower, the hybrids did not appear to be superior to the French open-pollinated varieties.

When the crop was harvested for silage only, the hybrids did not surpass the open-pollinated varieties in all cases.

Variétés de maïs hybride inscrites au catalogue officiel des espèces et variétés. (Varieties of hybrid maize entered in the official catalogue of species and varieties). (p. 141).

Twenty American hybrids are listed in descending order according to earliness.

- 290 ROMANOV, I. K.
(Seed and seed growing).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 17-20.
[Russian].

Several productive varieties of cereals and other economic plants, which are adapted to the climatic conditions of the Vorošilovgrad province, are mentioned. They include a maize hybrid, VIR* 117, which yielded 25-26% more kernels in the trials than the other varieties and hybrids, and a productive new millet Mestnoe Beloe Starobeljskoe [Local White Starobeljsk] selected from local material at the Starobeljsk Varietal Field Station.

- 291 ŠČERBINA, A. & KOBZISTYĚ, JA.
(Growing maize for high yield).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 5 : 26-27. [Russian].

Reference is made to a productive hybrid Uspeh [Success], grown from F₁ seed in the Dnepropetrovsk province. The seed is obtained from a cross between Dnepropetrovsk and Gruševskaja 380.

- 292 Maize hybrids and varieties.
Agric. Gaz. N.S.W. 1953 : 64 : 239-40, 270-71.

Hybrids and open-pollinated varieties recommended for grain or fodder and silage production in the different districts of New South Wales are listed. Descriptions are given of the recommended hybrids.

- 293 FAIRCHILD, R. S.
Comparative development of the embryos of inbred and hybrid maize.
Iowa St. Coll. J. Sci. 1953 : 27 : 381-405.

Two inbred lines and their reciprocal crosses were compared to explore the possibility that heterosis may be expressed in the morphological or histological development of the embryo.

The hybrids manifested evidence of heterosis in plumule development, the development of the first internode, in the radicle and in the seminal roots.

- 294 FERWERDA, F. P.
Methods to synchronize the flowering time of the components in crossing plots for the production of hybrid seed corn.

Euphytica, Wageningen 1953 : 2 : 127-34.
Methods are discussed by which hybridization between varieties of maize flowering at different times may be effected. The most practical way is to delay the planting of the earlier variety, preferably the pollen parent, or to retard its reproductive development. Means by which the flowering times of the two parents may be determined prior to planting are given.

- 295 REEVES, R. G.
New "evidence" on the origin of maize.
Amer. Nat. 1953 : 87 : 157-59.

On cytological and other grounds, arguments are given against Randolph's dismissal of the possibility of the hybrid origin of teosinte from maize and *Tripsacum* (cf. PBA, Vol. XXIII, Abst. 314), and in support of the hypothesis of Mangelsdorf and Reeves (cf. PBA, Vol. X, Abst. 760).

- 296 NAMITOKOV, JU. K.
(Growing maize plants from embryos with the endosperms removed).
Agrobiologija (Agrobiology) 1953 : No. 2 : 32-33. [Russian].

At Maikop, abnormal maize plants were obtained when the endosperms were removed from kernels of the variety Leaming. The plants were 150-160 cm. high and had stems half as thick as the controls. Only two individuals survived till maturity. One plant produced a *Sorghum* panicle. The other bore a small ear with 80 kernels, which differed in appearance from that of a normal Leaming ear.

- 297 HASKELL, G.
The graphic evaluation of a breeding system.
Heredity 1953 : 7 : 239-45.

Silking date, time of first pollen shedding and

* Vsesojuznyi Institut Rastenievodstva [USSR Institute of Plant Industry].

number of plants plotted together in a three-dimensional graph provide more information on the breeding system of maize than the conventional plotting of percentage flowering against time. The former method provides a means of assessing the breeding behaviour of individuals within a population and also between two interbreeding populations. The relation of dichogamy with flowering time is also classified. The earliest plants in the two populations studied, a flint maize and sweet corn, were more protogynous and therefore more outbred than later plants, which were more protandrous, shedding their pollen while the silks were emerging and thus having greater opportunity of inbreeding. The genetical effects of this breeding system upon heterosis is discussed. The three-dimensional graph is compared with other graphic methods of representing flowering behaviour. It is considered to be valuable for comparing the breeding behaviour not only of open-pollinated varieties, inbreds and hybrids of maize but also of other species.

- 298 RHOADES, M. M. & DEMPSEY, E.
Cytogenetic studies of deficient-duplicate chromosomes derived from inversion heterozygotes in maize.
Amer. J. Bot. 1953 : 40 : 405-24.

Data are presented on the recombination values for certain loci within the paracentric inversion, designated In 3a, on the long arm of chromosome 3 in a *Tu* stock used as a genetic tester at the University of Illinois. Recombination values were reduced in inversion heterozygotes. An apparent increase in crossing over was observed for adjacent regions proximal to the inversion. Breakage of dicentric bridges resulting from crossing over in lines derived from female parents heterozygous for In 3a gave rise to chromosomes deficient for the small segment distal to the inversion but carrying varying lengths of proximal segments in duplicate. Approximately half these deficient-duplicate chromosomes showed an inverted sequence; the other half showed a normal sequence. Some 25% of the deficient-duplicate chromosomes were transmitted by maternal inheritance; none were transmitted by means of the pollen. This transmission of deficiencies and duplications is contrasted with McClintock's failure to obtain viable products of bridge breakage in any of the paracentric inversions she studied (cf. *PBA*, Vol. IX, Abst. 248, Vol. X, Abst. 137 and Vol. XI, Abst. 979). It is assumed that the small distal segments for which viable offspring are deficient must have a relatively unimportant influence on maize development.

Recombination analyses with plants heterozygous for deficient-duplicates indicate that locus *Lg₃* is 12 recombination units from the proximal break of the inversion, while *Et* is three recombination units from the distal break.

- 299 FORD, L.
Cytogenetic study of a mutant maize *F₁* plant.
J. Hered. 1953 : 44 : 17-20.

Meiotic irregularities are reported from Ames, Ia., in selfed progenies and advanced generations of 49-BKQ, a mutant derived from the homozygous diploid H 65 (OS 420 x M 14) x (WF 9 x WF 22) crossed with the tester "N" (Randolph's 43687-1 brown liguleless stock). The advanced generations showed a wide range of pollen sterility and segregated for dwarfed growth habit. Chromosomal lagging, bridge formation and fragmentation were common in plants with more than 10% pollen sterility; aberrations observed in those with 50% pollen sterility probably included one or more inversions and deletions, particularly in the long arm of chromosomes 1 or 2.

- 300 ROCA, J. & ONDARZA V., R.
Estudios sobre la actividad enzimática en el proceso de germinación. IV. Proteasas en variedades de maíz. (Studies on the enzymatic activity in the process of germination. IV. Proteases in maize varieties).
An. Inst. Biol. Univ. Méx. 1952 : 23 : 3-12.

The analyses were carried out on three varieties, one adapted to altitudes of 1000-1900 m., the other two to 0-1300 m. The high-altitude variety reached its maximum proteolytic activity on the seventh day from germination as opposed to the fifth in the other two. The variety with the highest proteolytic activity also had the highest N content.

- 301 GROBMAN, A.
Efecto del factor suelo sobre la expresión de los genes *ts* en maíz. (Effect of the soil factor on the expression of the *ts* genes in maize).
Agronomía, La Molina 1953 : 18 : 53-63.

The occurrence of tasselseed in a triple lattice comprising a number of selfed lines and top crosses of their parents was not random and appeared to be correlated with a trend in soil fertility, particularly nitrogen, since plants displaying the character tasselseed had a greater tendency to tillering.

302 BROWN, W. L.

A summary of maize breeding techniques.

Trop. Agriculture, Trin. 1953 : 30 : 86-96.

The different selection methods involved in maize breeding are discussed, together with the value of maize classification in a breeding programme and the major problems involved in classification.

It is suggested that the effects of linkage in maize should be given particular consideration in breeding schemes designed to utilize genetic recombinations between different races.

303 VENKATESWARLU, J.

Meiosis in autotetraploid maize.

Abstr. Diss. Univ. Camb. 1950-51 (1953) : 20-21.

Meiosis was studied in pollen mother cells of colchicine-induced autotetraploid maize. A higher chiasma frequency was observed than in the comparable diploid, and the majority of the gametes were genetically unbalanced. Meiotic irregularities leading to numerical and qualitative disequilibrium were noticed.

304 MES, M. G.

On possible cultural methods of speeding up breeding experiments with maize. 2. The use of immature seed.

S. Afr. J. Sci. 1953 : 49 : 303-07.

In laboratory tests at the Plant Physiological Research Institute, University of Pretoria, seeds with a water content originally just below 68% were capable of consistently giving 100% germination, if first dried. If the seeds were germinated before being planted in soil, satisfactory plants were produced from seeds with an original water content up to 82%. When immature seeds were sown directly in soil, seeds with an original water content of 58% or less, showed 90-100% germination, and produced plants similar in size, time of flowering and yield to controls developed from fully mature seeds. A 58% water content was reached approximately 4-5 weeks after silking. For breeding purposes therefore, two generations can be grown in one season, by using immature seeds harvested at the end of December from the first crop, and sowing these at the beginning of January; ears from the second crop can be harvested in April.

305 NICKERSON, N. H.

Variation in cob morphology among certain archaeological and ethnological races of maize.

Ann. Mo. Bot. Gdn. 1953 : 40 : 79-111.

Morphological characters were measured in

approximately 500 cobs representing both modern and archeological varieties. The external characters used were over-all shape, shank diameter, cob diameter and row number. The following internal characters were measured: cupule width and depth, height of rachis flaps, kernel thickness, width of lower glume, rachis diameter and pith diameter. Analysis of pictorialized scatter diagrams of average measurements indicated a high degree of association between these characters. The results are compared with those obtained by previous investigators, using other methods, and in relation to ethnological and archeological findings. General agreement is found, showing the validity of cob analysis for characterizing racial variation.

306 WILLIAMS, J. H. & JOHNSON, I. J.

Inheritance of differential response of corn root tissues to 2,4-D.

Agron. J. 1953 : 45 : 298-301.

Progenies derived from crosses involving nine maize inbreds, representing a range from tolerance to susceptibility with respect to 2,4-D, were tested for the response of their seedling roots to aqueous solutions of the Na salt of 2,4-D. Data on F_3 lines from one cross between tolerant parents provided evidence of transgression for susceptibility. In a cross between tolerant and susceptible inbreds, the F_3 mean was intermediate between the parental values and the BC_1S_1 means were shifted towards their respective recurrent parents. The components of genetic variance among progenies within crosses were lower for the cross between susceptible parents, and the BC_1S_1 progenies already referred to, than for crosses between tolerant and susceptible inbreds. Reciprocal F_1 crosses did not show significant differences, indicating that the maternal pericarp tissue probably had no effect upon the response of the seedling root. F_1 data suggested partial dominance of susceptibility to 2,4-D. The correlation between the F_1 and parental means was highly significant (0.718).

307 JEFFREYS, M. D. W.

Maize and its Old World introduction.

S. Afr. J. Sci. 1953 : 49 : 322-24.

GOODWIN, A. J. H.

Maize in the Old World.

Ibid. 1953 : 50 : p. 19.

Attention is drawn by Jeffreys to two discrepant translations of a letter by Columbus in which he states that maize "haze una, espiga, como una maçorca, de que lleve yo alla, y ay ya mucho en Castilla." An early translation of this passage by R. H. Major credits Columbus with bringing

maize from Spain to America; a later translation by C. Jane assumes an introduction of maize into Spain from America. Jeffreys, referring to Finan's conclusion that maize was probably present in Europe before the discovery of America (cf. *PBA*, Vol. XIX, Abst. 284, and Vol. XXII, p. 633), decides that either translation may represent what actually occurred. Goodwin interprets "maçorca" as sorghum and takes the passage to mean that Columbus transported sorghum to America from Spain.

- 308 HUBER, L. L. & SCHAAF, H. M.
65th Annual Report of the Pennsylvania Agricultural Experiment Station 1953: Science for the farmer.
Bull. No. 533 : Suppl. No. 2.

Progress in developing maize hybrids resistant to drought is reported and details are given of new hybrids.

- 309 BROOKS, J. S., PASS, H., RICHARDSON, W. L. & SMITH, J. W.
Oklahoma 301 a new hybrid corn for Oklahoma.
Bull. Okla. Agric. Exp. Sta. 1953 : No. B-390 : Pp. 6.

A new hybrid maize variety, Oklahoma 301, is described. It is late maturing, produces a good yield of high quality yellow grain, possesses tall stalks resistant to lodging, and was developed from the double cross (Cl. 21E x K 201) x (Ok. 12 x Kys).

- 310 WARREN, J. R.
A study of Stewart's disease of corn with special reference to factors related to resistance and susceptibility.
Abstr. Doct. Diss. Univ. Ohio 1950-51 (1953) : No. 64 : 535-41.

At the Ohio State University, inoculation of resistant and susceptible maize inbreds with isolates of *Bacterium stewartii* labelled with radioactive P³² has shown that reaction to infection is not correlated with distribution of bacteria within the host. Production of substances toxic to maize was greater in susceptible than in resistant hosts. A high correlation was found between resistance and the occurrence of phages or phage precursors within the host.

- 311 STANTON, W. R. & CAMMACK, R. H.
Resistance to the maize rust, *Puccinia polysora* Underw.
Nature, Lond. 1953 : 172 : 505-06.

A wide range of maize varieties have been tested for their reaction to *P. polysora* at the West African Maize Rust Research Unit, Ibadan, Nigeria. Several Mexican, Caribbean and

Venezuelan varieties have exhibited tolerance or a high degree of resistance. African and Asiatic varieties have proved susceptible. Resistance is dominant to susceptibility, according to the results of preliminary crosses. Several grades of resistance and susceptibility have been detected. Five varieties from Mexico show promise of being suitable as parents in breeding resistant varieties adapted to West African conditions.

- 312 MELHUS, I. E. & SMITH, F. O.
***Helminthosporium* leaf blight of corn in Guatemala.**
Turrialba 1953 : 3 : 14-22.

Particulars are presented of the maize leaf blight *Helminthosporium turcicum*. The Giganteum group of maize varieties proved less susceptible than the Early, Coast or Mountain groups, and Guatemalan varieties were more resistant than those from the USA. Data are included on resistant varieties belonging to the Giganteum group, such as 47A-46, 134A-46, 31-44, 159-44, 1483-45, 92A-46 and 20-47, and the results of crossing these strains with susceptible US varieties are given.

- 313 **Results of 1952 tests of corn hybrids and varieties.**

Miss. Fm Res. 1953 : 16 : No. 1 : 4-7.
The results of hybrid maize variety trials throughout Mississippi are tabulated. Varieties giving the highest yield were Pfister (PAG) 631, an early maturing strain, Dixie 11, Dixie 17, Dixie 22 and Dixie 33.

Coker 811, Dixie 18 and Mississippi 1123 combined a comparatively high yield with high resistance to lodging.

- 314 WITTE, K.
Körnermais-Sorten- und Berechnungsver-such. (**Grain-maize variety and over-head irrigation experiment**).
Saatgutwirtschaft, Stuttgart 1953 : 5 : 227-28.

Nine American varieties of hybrid maize were tested. U26, U20 and U20a gave the highest yields, and also showed a greater relative increase from the supplementary water supply.

- 315 HUBER, L. L., SCHAAF, H. M. & SATCHEL, D. P.
Pennsylvania corn performance studies.
Progr. Rep. Pa Agric. Exp. Sta. 1953 : No. 102 : Pp. 8.

The results are given of comprehensive variety trials, conducted during 1951 and 1952, to evaluate new experimental maize hybrids. Data are included on yield, drought resistance,

incidence of stalk rot, and resistance to lodging, diseases and pests.

BARLEY

316 JOHNSON, I. J.

Registration of barley varieties.

Agron. J. 1953 : 45 : 320-22.

Descriptions are given of six barleys recently registered in the United States: the Swedish variety Edda (cf. *PBA*, Vol. XIII, Abst. 849); Harbine (cf. *PBA*, Vol. XXI, Abst. 1023); Kenbar (cf. *PBA*, Vol. XXIII, Abst. 1183); Mo. B-400 (cf. *PBA*, Vol. XXIII, Abst. 1184); Dichtoo and Kearney (cf. *PBA*, Vol. XXIII, Abst. 242).

317 NESTEROVA, A.

(New standard varieties of spring barley).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : p. 66.
[Russian].

Peredovoi [Front], recently made a standard in the Sverdlovsk province, Omsk 3601 in the Krasnojarsk territory, and Belorusskii 1 [White Russian 1] in the Minsk province, are briefly described. Peredovoi shows resistance to lodging and is more productive, but 3-5 days later than Viner. The grain is large. Omsk 3601 was selected from a North Caucasian barley. It shows resistance to lodging, shedding and some diseases, including loose smut and *Helminthosporium* and is more productive than the standard Viner. The 1000 seed weight is 48-50 g. It is 1-4 days later than Viner. Belorusskii 1 was obtained by single plant selection from a barley sample in the collection of the USSR Institute of Plant Industry. It has similar properties to those of Viner, but yields 1-1.2 c. more grain per ha.

318 HÖRBERG, Y.

Kornförädlingen vid Weibullsholm.
(Barley breeding at Weibullsholm).
Weibulls Årsb. 1953 : 12-15.

The aims and the advances made in barley breeding at the Weibullsholm Plant Breeding Institute, Sweden, are set out, with a separate note on the present trend in the breeding of winter barleys for Swedish requirements, which include strength of straw, grain quality, winter hardiness and resistance to mildew and rust.

319 WILTEN, W.

Opbrengsten, rassenstatistiek en raseigenschappen van zomergerst. (Yields, statistics and characteristics of varieties of spring barley).

17e Nacobrouw Jb. 1953 : 96-106.

The yields, acreage and characteristics of spring

barleys in cultivation in the Netherlands are shown in five tables, each accompanied by a brief commentary (cf. *PBA*, Vol. XXIII, p. 484). In the south-western, clay district, the malting barley Pirolina (= Heine 505) and the fodder variety Frisia (= Breusted 1038/45) averaged 9% more in yield than the standard, Balder. In addition to its good malting quality, Pirolina also showed its superiority to Herta in agricultural characteristics, except stiffness of straw.

320 ATKINS, R. E.

Effect of selection upon bulk hybrid barley populations.

Agron. J. 1953 : 45 : 311-14.

At the Iowa Agricultural Experiment Station, F_2 bulk populations were selected for plant vigour and large, well-filled and disease-free heads; further selection was effected in the F_3 and F_4 . The selected populations of eight of the crosses were then compared with their respective bulk populations during the period 1949-51, with respect to yield, date of heading, date of maturity, plant height and lodging resistance. Selection was not effective in isolating appreciably higher yielding lines. Segregates from selected populations were approximately two days later in heading, one day later in maturity and $1\frac{1}{2}$ inches taller than the corresponding bulk populations. The two types of population did not differ in resistance to lodging. Examination of the variance for selected and bulk F_7 lines of four crosses grown in 1951 only partly substantiated the expectation that the selected populations would be reduced in variability for yield, compared with the bulk lines.

321 HAGBERG, A.

Heterosis in barley.

Hereditas, Lund 1953 : 39 : 325-48.

The F_1 generations of 17 crosses were compared with their respective parents. As a rule, the F_1 was intermediate, or equal to the parent with the higher value, with respect to rapidity of growth in the young plants, earliness of heading and ripening, tillering, ear length, 1000 seed weight and grain yield per plant. In weight of the whole plant at the stage of ripeness, the F_1 was often superior, or at least equal, to both parents; in some combinations, however, the F_1 was intermediate. In the F_1 of crosses between six-rowed and two-rowed barleys, the 1000 seed weight was about 20% higher than that of the two-rowed variety, the parent with the greater weight. In all combinations, fertility and meiosis were normal. Autotetraploid and

corresponding crosses exhibited no differences in expression of heterosis. No relationship could be detected between heterosis and degree of geographical differentiation between the parents. For five of the 17 combinations, inbreeding curves for plant height and grain yield have been obtained up to and including the F_6 . The shapes of such curves and their position in relation to the parental values depend upon the selective pressures exerted by man, heterosis being shown in plant height but not in yield. Plant height has undergone negative selection or none at all, whereas yield has been subjected to strong positive selection. Brieger has suggested that the degree of heterosis should be determined by comparing the F_1 with the following generations, disregarding the parental values (cf. *PBA*, Vol. XXI, Abst. 292). On the basis of this definition of heterosis, the above kinds of characters, typified by yield and plant height, cannot be distinguished.

322 BUCHLI, M.

Die Wintergerstsorten des schweizerischen Richtsortimentes für den Getreidebau 1953. (**The winter barley varieties of the Swiss variety guide for cereal cultivation, 1953**).

Mitt. schweiz. Landw. 1953 : 1 : 140-44.

Full data are presented on the four winter barley varieties, Riniker, Argovia M, Selemer and Gembloux 456, included in the Swiss variety guide for 1953.

323 OINUMA, T.

(**Nuclear morphology in the cereals. I. On the constancy of the karyotype in each variety and its relevance for the basic problems involved in studies of nuclear morphology**).

Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 56-64. [Japanese].

Various killing and staining procedures did not alter the relative dimensions of the chromosomes in each of the following barleys: *Hordeum agriocrithon*, Hosowara 2 [Slender-strawed 2], Rokkaku 1 [Six-edged 1] and Harubin Nijo [Harbin Two-rowed]. Within each variety, the relative chromosome dimensions remained constant. Chromosome contraction, induced by chloral hydrate, was also without effect on the relative chromosome dimensions.

324 TSUCHIYA, T.

(**Cytogenetic studies of a triploid barley hybrid**).

Seiken Jiho/Rep. Kihara Inst. Biol. Res. 1952 : No. 5 : 78-93. [Japanese].

A detailed description is given of meiosis in a

triploid obtained by crossing a tetraploid Japanese strain of *Hordeum distichum* and the diploid *H. spontaneum* var. *nigrum*. At metaphase 0-7 trivalents were produced, and one cell was observed with a quadrivalent. Fertility was good for a triploid.

325 EHRENBURG, L., GUSTAFSSON, Å., LUNDQVIST, U. & NYBOM, N.

(**Irradiation effects, seed soaking and oxygen pressure in barley**).

Hereditas, Lund 1953 : 39 : 493-504.

Data were obtained on the effects of seed treatment with X rays or neutrons, under different conditions, upon germination, the chromosomes in the seedlings, seedling growth, fertility, and frequency of mutant characters in the X_2 and X_3 . With presoaked seeds, a low dosage of X irradiation increased the frequency of mutation, whereas high dosages caused a marked reduction (cf. *PBA*, Vol. XXIII, Vol. 1949). The latter decrease is ascribed to "intracellular selection," due to the cumulative physiological killing of the most radiosensitive cells, and consequent elimination of genetical changes. This selection became even more conspicuous if the irradiation of presoaked seeds took place in an atmosphere of oxygen. X irradiation of presoaked seeds in a nitrogen atmosphere resulted in a decreased rate of mutation compared with irradiation in air. Oxygen pressure had a negligible influence upon the effects of neutron irradiation. X rays and neutrons are therefore regarded as differing in their mode of action. X rays are believed to act, at least partially, in an indirect manner, a nonlocalized ionization occurring primarily in the H_2O molecules and giving rise to active radicals. Neutrons are regarded as having a direct action. The process of intracellular selection is readily affected by physiological factors, and appears to be due to the indirect effects of irradiation, involving the plasma constituents. To obtain conclusive data on the rates and types of X-ray-induced genetic changes, low dosages should be employed, at which such selection does not occur.

326 NYBOM, N., LUNDQVIST, U., GUSTAFSSON, Å. & EHRENBURG, L.

(**Biological effects of X-irradiation at low temperatures**).

Hereditas, Lund 1953 : 39 : 445-57.

Barley seeds were placed in liquid air (ca. -190°C) or water at $+20^\circ\text{C}$, and then X-irradiated. Data on the chromosome distribution in the X_1 seedlings, growth and fertility of the X_1 , and frequency of mutant characters in the X_2 indicated that the irradiation was less

injurious at -190°C . The low temperature acted protectively against both the physiological and genetical effects of irradiation, eliminating most or part of its indirect chemical action.

327 KORTENHORST, A. T.

De moutkwaliteit van Balder, Kenia, Piroline en Herta. (**The malting quality of Balder, Kenia, Piroline and Herta**).

17e Nacoubrouw Jb. 1953 : 83-87.

In malting quality the new variety Piroline (= Heine 505) equals Balder and Kenia and it is superior in yield of malt. Herta is inferior to the other three varieties owing to the difficulties it presents in the actual process of malting.

328 COVAS, G.

Dos nuevas especies de "*Hordeum*" de la flora Argentina. (**Two new species of *Hordeum* in the Argentine flora**).
Rev. Argent. Agron. 1953 : 20 : 63-67.

Descriptions are given of *H. patagonicum* ($2n = 14?$) and *H. tetraploidum* ($2n = 28$), both from Patagonia.

329 NIJDAM, F. E.

Het rassenonderzoek bij zomergerst. (**The study of spring barley varieties**).
17e Nacoubrouw Jb. 1953 : 28-44.

An historical review of the role of spring barleys in agriculture in the Netherlands is followed by a discussion on the distinguishing characteristics of barley varieties and on the identification of 2-rowed and 4-rowed forms.

330 FREY, K. J.

Winter barley varieties for south-western Michigan.

Quart. Bull. Mich. Agric. Exp. Sta. 1953 : 35 : 433-35.

The results are given of trials of barleys resistant to winter killing, and full particulars are included of the three varieties, Hudson, Wong and Kenbar, recommended for southern Michigan. All possess very stiff straw and thus high resistance to lodging. The new variety Hudson is a selection from a cross between Wong and Michigan Winter and gives a high yield of good quality grain. Seed will be available in the autumn of 1954.

331 TAPKE, V. F.

Longevity in *Ustilago nuda*.

Phytopathology 1953:43 : p.407. (Abst.).

Although 57 varieties of spring barley were tested, only four proved useful for differentiating physiological races of *U. nuda*; these were Charlottetown, Compana, Valki and Stephan. Five distinct races were identified among 123 isolates from different parts of the USA. One

race was more widespread than the rest and occurred in 60% of the collections.

332 KONZAK, C. F.

Inheritance of resistance in barley to physiologic races of *Ustilago nuda*.

Phytopathology 1953 : 43 : 369-75.

Under greenhouse conditions at Cornell University, Ithaca, NY, the reaction to each of eight physiological races of *U. nuda* was investigated in the F_2 and F_3 of the following crosses and their reciprocals: Jet x Odessa, Valki x Odessa and Jet x Valki. Resistance proved dominant to susceptibility in all crosses. Odessa was susceptible to all races, but Valki and Jet were resistant, the number of genes involved being different for particular races. Both Valki and Jet were found to possess a gene for resistance to race 1. They each had two genes for resistance to races 3 and 7, but whereas both were required for resistance in Valki, either conferred resistance in Jet. Resistance to races 4 and 8 was conditioned by either of two independent genes in each variety. Jet carried a single gene for resistance to race 6, but two factors were necessary for resistance in Valki. Since there is evidence for similarity between races 3 and 7, and between races 4 and 8, no attempt has been made to assign genetic symbols to the genes involved until genic interrelationships are more clearly understood.

333 NOORDHOFF, L. J.

Try Carolina's Davie barley.

Sth. Seedsman 1953 : 16 : No. 8 : p. 36.

Davie, an awned barley, bred at the North Carolina Agricultural Experiment Station for the Piedmont area, compares favourably in respect of yield, maturity, lodging resistance and winter hardiness with Colonial 2, the variety previously recommended for this region. Davie, however, possesses a much higher degree of resistance to common races of rust and mildew than Colonial 2.

334 **Report of the Barley Committee of the European Brewery Convention 1951 (1953) : Pp. 73.**

A full report is given of field and malting trials of the barley varieties Carlsberg, Earl, Gold, Haisa and Herta in ten European countries.

MILLETS AND SORGHUMS

335 VARENICA, E. T. & KOROVKIN, N. N.

(The biology of flowering and the development of seed in *Setaria*).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : 28-30. [Russian].

Some varieties of *Setaria* were studied at

Nemčinovka. A close correlation was established between the panicle and ripe kernel weights. Selection for panicle weight is regarded as a good method of improving the productiveness of a variety. The size of the kernels of most varieties varied according to their position on the plant, the largest seed being found in the central portions of the panicles. The differences in seed size were less marked in early-maturing varieties such as Egorjevskaja and Istra.

- 336 NAKAO, S. & YABUNO, T.
Cytological and ecological studies on Japanese barnyard millet [*Echinochloa frumentacea* (Roxb.) Link.] and its wild relatives. I. Classification of Japanese indigenous species in relation to cytology and ecology.
Seiken Jiho/Rep. Kihara Inst. Biol. Res. 1952 : No. 5 : 58-64.

Following Owi's system, a collection of cultivated strains has been classified into two groups: the awnless (*E. frumentacea*, $n = 27$), and awned (*E. frumentacea* var. *atherachne*, $n = 27$). The weed forms have been divided into three groups: *E. crus-galli* var. *oryzicola* ($n = 18$), *E. crus-galli* var. *praticola* ($n = 27$) and *E. crus-galli* sens. str. and var. *caudata*, with $n = 27$. The three wild groups are ecologically as well as morphologically distinct, and hybridization between them is very rare. A basic chromosome number of $x = 9$ is suggested for the genus.

- 337 KOTELJNIKOVA, E. S.
(Varieties of millet).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 53-56.
[Russian].

Recent Soviet standard varieties of millet, including Ural 1419, Veselyi Podol 38, Iljičevskoe, Ostrogož 9 and Voronež 3985, selected from local material, are described. They are productive, show resistance to shedding and lodging and bear good quality grain and are suitable for combine harvesting. Kinelj 3221 has similar properties to the above varieties. Kamalinskoe 591, bred at the Kamalino State Breeding Station, is earlier than Kazanj 506 and escapes frost injury in the autumn.

- 338 KARPER, R. E.
Registration of sorghum varieties, VI.
Agron. J. 1953 : 45 : 322-23.

The following sorghums, recently registered in the United States, are described: Combine Kafir-60, Redbine-60 and Redbine-66 (cf. *PBA*, Vol. XXI, Abst. 343); Hi-Hegari (cf. *PBA*, Vol.

XXI, 1691); Popsorghum (cf. *PBA*, Vol. XXI, Abst. 2672); and Sart (cf. *PBA*, Vol. XXII, Abst. 2107).

- 339 FRANZKE, C. J.
Reliance. An early grain sorghum.
Bull. S. Dak. Agric. Exp. Sta. 1953 : No. 426 : Pp. 4.

Reliance, a new variety of sorghum, selected from a cross between Modoc and Sooner Milo, is described. It has a high yield, wide range in planting time, is more highly resistant to frost and lodging than the variety Norghum, and is well adapted to the conditions prevailing in South Dakota.

- 340 DAVIES, F. F. & SIEGLINGER, J. B.
Darset; a combine-type darso.
Bull. Okla. Agric. Exp. Sta. 1953 : No. B-391 : Pp. 6.

The dwarf characteristics of a new darso type sorghum, Darset, developed from a cross between Oklahoma 1 darso and an unspecified dwarf sorghum, make it suitable for combine harvesting. Its yield equals that of Oklahoma 1 which it resembles in all respects apart from its dwarf characteristics and slightly earlier maturity. A bitter tannin-like substance in the subepidermal layer renders the grain resistant to bird and weather damage. (Cf. *PBA*, Vol. XXIII, Abst. 351).

- 341 PONNAIYA, B. W. X. & APPATHURAI, R.
Studies in sorghum—the fundamentals of the white and dull mid-rib.
Madras Agric. J. 1953 : 40 : 302-05.

Two strains of *Sorghum subglabrescens*, Cholan K 2 and Cholan MS 8159, were studied to determine the reason for the white or dull colour of the midrib, a genetically determined characteristic. The dull colour was found to be due to a higher cell-sap content.

- 342 MEHTA, P. R., BABU SINGH, MATHUR, S. C. & SINGH, S. B.
Varietal reaction of jowar to grain smut.
Nature, Lond. 1953 : 172 : p. 591.

Sorghum varieties have been tested for their reaction to smut (*Sphacelotheca sorghi*) at Kanpur, United Provinces, India. The varieties 31B and 4101 were highly resistant.

- 343 GEERING, Q. A.
The sorghum midge, *Contarinia sorghicola* (Coq.), in East Africa.
Bull. Ent. Res. 1953 : 44 : Pt. 2 : 363-66.

The above midge has caused serious damage in sorghum breeding plots at the Cotton Research

Station, Namulonge, Uganda. Probably the midge occurs in all the main sorghum-growing areas of Africa, since it breeds on three wild species, *Sorghum sudanense*, *S. halepense* and *S. verticilliflorum*. From observations at the Gezira Research Station, Sudan, S. H. Evelyn has concluded that resistance is probably genetic. The degree of apposition of the glumes, affecting oviposition, may be a factor involved in resistance.

- 344 BOWDEN, J. & NEVE, R. A.
Sorghum midge and resistant varieties in the Gold Coast.
Nature, Lond. 1953 : 172 : p. 551.

Failure of sorghum to set seed has been found to be primarily due to attacks by midge (*Contarinia sorghicola*). Early flowering provides a means of escape from attack, but one group of varieties, typified by Nunaba and found only in the northeastern district of the Gold Coast, is apparently resistant, being protected by long papery glumes which do not normally open at anthesis (cf. Abst. 343). Nunaba and related varieties have been used in crossing, to introduce the character of nonopening glumes into a wider range of sorghums.

RICE

- 345 SAMAI CHAROENRAT [SAMAN(Y)
CHERIN(Y)RAT(TH)]
(The work of American research stations).
Kasikon(r) (Farmer), Bangkok 1952 : 25 : 474-80. [Siamese].

This account of the American research stations concerned with rice includes a brief review of their breeding programmes.

- 346 NAQVI, R. H.
Selection on the basis of colour of grain and its effect on the fat and protein contents in rice.
Agric. Pakist. 1952 : 3 : 28-29.

Selective breeding of the paddy varieties KE-216, Assamia and Gopalbhog showed that dark variations in the colour of the kernel were a genetic characteristic and that depth of colour was accompanied by increased fat and protein content.

- 347 LOVE, H. H.
Brief report from Thailand on the japonica-indica crosses grown in 1952.
News Lett. FAO Internat. Rice Comm. 1953 : No. 5 : 10-11.

F₁ seed of crosses of four Thailand varieties of

indica rice with eight *japonica* types was produced at the Central Rice Research Institute, Cuttack, India, as part of the rice improvement scheme sponsored by FAO (cf. *PBA*, Vol. XXII, Abst. 1939). The F₂ generations have been grown in northern Thailand and the Central Plain, and sufficient seed has been obtained for further testing.

- 348 PIACCO, R.
Esito del concorso 1952 per la selezione sementi. (**Success of the 1952 rice selection competition**).
Riso, Milano 1953 : 2 : No. 9 : p. 22.

The specimens submitted included seven new varieties, S. Gaudenzio, ED 6, 7 and 8, Precoce Rossi [Early Rossi], Colombo [Dove] and Marchetti.

- 349 LUONG DINH CUA
Artificial polyploidy in the Oryzae. II. On the germination behaviour of diploid and autotetraploid rice (*Oryza sativa* L.).
Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : 161-65.

The period to germination of three varieties of diploid rice was compared with that of their corresponding colchicine-induced tetraploids. At any given temperature the $4n$ seeds germinated more slowly than the $2n$, the difference decreasing as the temperature was raised. The percentage of $4n$ seeds which failed to germinate was greater than that of $2n$ seeds, this being most marked at the higher and lower temperatures.

- 350 LUONG DINH CUA
Artificial polyploidy in the Oryzae, III. Cytogenetical studies on intra- and inter-subspecies tetraploid hybrids in *Oryza sativa* L.
Seiken Jiho/Rep. Kihara Inst. Biol. Res. 1952 : No. 5 : 42-53.

Varying degrees of partial sterility in the F₁ generation of various intervarietal crosses of rice are attributed to the differentiation between the two subspecies, *O. sativa* subsp. *indica* and *japonica* which, although possessing the same number of chromosomes and substantially identical genomes, have also developed complex gene mutations and genic rearrangements within the chromosomes which have led to differentiation between the chromosome pairs of the two haploid sets. This differentiation varies considerably, as shown by the different degrees of sterility in F₁ hybrids of different subspecies crosses.

Colchicine treatment of partially sterile inter-subspecific F_1 hybrids resulted in improved fertility, and this increased fertility was maintained in the F_2 and succeeding generations.

- 351 CHANDRARATNA, M. F., FERNANDO, L. H. & WATTEGEDERA, C.

Seed dormancy in rice.

Trop. Agriculturist 1952 : 108 : 261-64.

The results of germination tests at the Rice Research Station, Batalagoda, Ceylon, suggested that dormancy is related to photoperiodic reaction. In varieties relatively insensitive to photoperiod, the duration of dormancy did not exceed six weeks, whereas in most of the highly sensitive varieties, the dormancy period exceeded six weeks.

- 352 COOLHAAS, C. & WORMER, T. M.

Developmental differences in rice plants in relation to photoperiodism.

Netherlands J. Agric. Sci. 1953 : 1 : 202-16.

An account is given of the development of five varieties of rice grown under photoperiods of various lengths. It was found that in photoperiodically sensitive varieties earliness is induced by short photoperiods and that the size of the panicle is greatly affected by the length of the photoperiod.

- 353 MISRO, B.

Synchronising flowering time in rice.

News Lett. FAO Internat. Rice Comm. 1953 : No. 6 : 1-2.

Under conditions at the Central Rice Research Institute, Cuttack, India, varieties of the *japonica* type flower 45-65 days after sowing at any time of the year. Varieties of the *indica* type either flower only during a particular season, or flower 90-170 days after sowing at any time. Synchronization in flowering time, necessary for crossing the two types, has been obtained by (1) sowing the latter type of *indica* rice a fortnight earlier than the *japonica* parent, (2) growing the period-fixed *indica* and *japonica* types in pots of different sizes, and (3) photoperiodic treatment of the late-maturing, season-fixed type of *indica*.

- 354 PARTHASANATHY, N.

Progress report on the International Rice Hybridization Project.

News Lett. FAO Internat. Rice Comm. 1953 : No. 5 : 9-10.

F_1 seed from crosses between *japonica* and *indica* varieties, made at the Central Rice Research Institute, Cuttack, India, has been distributed for F_2 selection in countries participating in the above project (cf. *PBA*, Vol.

XXII, Abst. 1939). Some of the combinations with over 50% seed sterility in the F_1 were back-crossed to their *indica* parents in the hope of obtaining increased fertility, but only a seed-setting percentage of 5.2% occurred, with 21,699 pollinations. Seed produced by the back-cross progenies will be distributed for further selection. Varieties of *indica* rice from several countries are to be crossed with two Japanese varieties of the *japonica* type, Fukoku and Zuiho. When crossed with *indica* rice, the latter are known to give highly fertile hybrids. The causes of sterility in interracial hybrids are to be investigated cytologically. The value of tetraploids of the F_1 hybrids in raising the fertility of cross combinations by suitable breeding methods is also to be explored.

- 355 SYAKUDO [SHAKUDO], K.

[Studies on quantitative inheritance. VI. A. Rice. (c). Studies on the inheritance and quantitative function of the genes determining the size of the unhulled grains. 1. On the quantitative function of the genes Gr_1 , Gr_2 and Ka .

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 13-25. [Japanese].

The effects of the above three genes on the length, breadth and thickness of the grain was studied in the F_1 - F_4 of the cross Sodairyu [Large Coarse Grains] ($Gr_1 Gr_2 ka$) x Sekitori 120 [Champion 120] ($gr_1 gr_2 Ka$). The three loci primarily affect the density of the grains, but also control grain dimensions; the quantitative contribution of each pair of genes on the latter character is calculated.

Gr_1 appears to be identical with P_2 , controlling panicle length.

- 356 LARTER, L. N. H.

Rice variety trials in Malaya, 1947-50.

Sci. Ser. Dep. Agric. Malaya 1952 (1953) : No. 25 : Pp. 88.

The report gives a detailed account of the three-year programme of yield trials with wet padi varieties throughout the federation. The trials were more comprehensive than any previously held and recommendations are made on the possibilities for a number of varieties of pure line selection in specific areas.

A final section is devoted to trials of dry padi varieties carried out in Kelantan.

- 357 CALMA, V. C. & GANTIOQUI, L. L.

The performance of four varieties of glutinous rice.

Philipp. Agric. 1952 : 35 : 428-33.

The results are given of trials to determine the

yield, height, number of bearing culms, flowering period, date of maturity, degree of lodging, susceptibility to pests and diseases and percentage of milling of 4 varieties of glutinous rice, Dinamulag, Linihim, Malagkit Sungsong and Paleod. The trials were held at the College of Agriculture, Los Baños, Laguna.

- 358 LAMONT, N.
Rice improvement programme.
Report of three years trials 1949-52.
 Agric. J. Fiji 1952 : 23 : 66-71.

The results of yield trials and milling tests of varieties in Fiji are reported. In single-plant selection, particular attention is being given to the rice New Guinea, because of its advantages of indifference to planting time and resistance to yellows, and also because it appears to be a mixed type with respect to duration of flowering period.

- 359 ARIYANAYAGAM, D. V.
Saline paddy trials in the eastern division.
 Trop. Agriculturist 1953 : 109 : 16-18.

The results are given of salt-tolerant paddy variety trials. Uvar Vellai and SR 26 are recommended for cultivation in the saline areas of the Batticaloa district, being considerably superior in yield to the other varieties tested.

- 360 TARCHETTI, A.
 45 anni della Stazione di Riscicoltura.
(45 years of the Rice Experimental Station).
 Riso, Milano 1953 : 2 : No. 9 : 6-8.

An outline is given of the achievements of this, the first agricultural research station in Italy; as a result of its work since its foundation in 1908, rice yields in the Po valley have risen from 18 to 56 q. per ha.

CHENOPODIUM

- 361 KAWATANI, T. & OHNO [ONO], T.
(Chromosome numbers in *Chenopodium*. I. Chromosome numbers in *Ch. ambrosioides*, *Ch. ambrosioides* var. *anthelminticum* and some allied species).
 Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : 177-80. [Japanese].

The typical variety of *Ch. ambrosioides* exists in diploid ($2n = 16$), tetraploid and hexaploid strains; var. *anthelminticum* has $2n = 64$ chromosomes. Other counts made by the authors were: *Ch. botrys*, $2n = 16$; and *Ch. album*, *Ch. quinoa*, *Ch. bonus-henricus* and *Ch. giganteum*, $2n = 32$.

FORAGE GRASSES

- 362 Stammeforsøg med Hundegræs og Engsvingel 1949-1952. **(Strain trials with cocksfoot and meadow fescue, 1949-52).**

Tidsskr. Frøavl 1953 : No. 490 : 150-52.

Notes are given on ten strains of cocksfoot and seven of meadow fescue tested at various experimental stations in Denmark. All the strains, which were of Danish origin, were graded as first class and awarded the designation II after their names. The yield per ha. and its proportional distribution over the various cuts taken in the test period are shown for each variety in a table.

The three cocksfoot varieties, Sildig Roskilde II [Late Roskilde II], Pajbjerg Milka II and Adefa II, proved to be grazing types that produce few stems at the shooting stage.

- 363 Medio—persistent new bluestem—stubbornly shrugs off drouth.

Sth. Seedsman 1953 : 16 : No. 9 : 30, 53.

The grass Medio bluestem is described. It is highly resistant to drought, develops long runners which enable it to spread rapidly, and holds the soil well, providing a valuable check to erosion.

- 364 FORTMANN, H. R.
Performance of varieties of grass and legume species in Pennsylvania in 1952.
 Progr. Rep. Pa Agric. Exp. Sta. 1953 : No. 105 : Pp. 11.

Data are presented on variety trials, held at a number of centres, of various grass and legume species. Of the lucerne varieties tested, Atlantic and Narragansett were superior in yield, although the latter was shown to be susceptible to bacterial wilt. Buffalo and Ranger were resistant to wilt.

A list is given of varieties of millet, orchard grass, tall oatgrass, reed canary grass, brome grass, Sudan grass, ladino clover, red clover, birdsfoot trefoil and soya beans recommended for Pennsylvania.

- 365 MUDALIAR, C. R.
Plant introduction and improvement of grasses and legumes.
 Madras Agric. J. 1953 : 40 : 309-19.

Data are given on a number of grasses suitable for Madras State. Experiments in breeding and agronomy are to be carried out at Coimbatore, Hosur and Siruguppa. The setting up of a central Indian organization for plant breeding, testing, introduction of new varieties and collation of information from different sources

is advocated, together with a thorough survey of Indian forage plants and the establishment of a chain of grass and forage crops research stations.

- 366 NYGREN, A.
Nya vägar i gröförräddlingen. (New methods in *Poa* breeding).
Svensk JordbrForsk. 1953 : 50-56.

After a brief consideration of reproduction and apospory in *Poa*, the problems incidental to the use of interspecific hybridization as a method in *Poa* breeding are exemplified from American results, obtained with native and Swedish material (cf. *PBA*, Vol. XX, Abst. 2233 and Vol. XXIII, Abst. 1606).

Possible lines for future research in Sweden are suggested, with special emphasis on the importance and method of determining the regional adaptation of breeding material.

- 367 OLDEMEYER, D. L.
Methods of evaluating combining ability in orchardgrass, *Dactylis glomerata* L.
Abstr. Doct. Diss. Pa. St. Coll. 1952 (1953) : 15 : 79-83.

Three methods of evaluating the combining ability of seven early-maturing clones and five late-maturing clones were compared at the Pennsylvania State College. The pollen source was varied by including the two groups in the following: (1) a wide polycross consisting of 112 clones; (2) restricted polycrosses; and (3) blocks allowing all possible single crosses within each group. The number of clones in the two polycross plots had little effect on the results; progenies from the same clone in both plots were almost alike. Although the average yield of single crosses having a common parent was similar to that of polycross progenies derived from the same parent, the influence of specific combining ability was apparent, indicating the advisability of using single crosses for the final evaluation of clones.

A study of fertility relationships showed that self fertility of the parents had no significant influence on the yield of their offspring. The percentage seed set under bags or by open pollination was unrelated to the number of micronuclei per quartet.

- 368 CLARKE, M. F.
A study of the carotene and crude protein content of orchardgrass (*Dactylis glomerata* L.). II. Heritable variation.

Canad. J. Agric. Sci. 1953 : 33 : 246-53.
In experiments at the Agassiz Experimental

Station, BC, a study was made of 14 open-pollinated clones of cocksfoot and 12 clones selected from the I_5 of 7 of these. Each clone was crossed on to two unrelated testers, one an open-pollinated clone with low carotene and protein contents, and the other an I_5 clone with high values for both these constituents. In addition, a limited number of single crosses involving a few of the open-pollinated clones were analysed. Open-pollinated and I_5 clones, and also their crosses with the two testers, varied significantly in mean protein and carotene contents, the values for parents and test crosses being close. In the case of the open-pollinated clones, a significant tester effect was obtained for both constituents. In three out of the five groups of crosses studied, the correlation between carotene and crude protein was significant and positive. Considering all the crosses, protein content tended to lack phenotypic dominance, but in some cases partial dominance of high or low content was indicated. Certain I_5 clones were higher in carotene content than their open-pollinated parents, suggesting that inbreeding resulted in homozygosity in certain loci for this character.

- 369 NORDENSKIÖLD, H.
A genetical study in the mode of segregation in hexaploid *Phleum pratense*.
Hereditas, Lund 1953 : 39 : 469-88.

Segregation for green and white seedlings was studied in F_1 and F_2 families derived from 21 normal plants of the timothy *Omnia*, a fairly self-fertile strain. Segregation was of the hexasomic type. Every plant tested in the two consecutive generations possessed genes for white seedlings; the majority apparently contain such genes at several loci, the mode of hexasomic segregation thus being highly complicated. Such a system makes possible the concealment of numerous lethal genes in vigorous populations. As a consequence of the hexasomic mode of segregation, it must be assumed that the six genomes are more or less homologous, and that the corresponding chromosomes are able to pair at random, although multivalents are rarely formed.

- 370 FRANDSEN, K. J. & NISSEN, Ö.
Prövning av vallväxtstammar. (Testing strains of herbage plants).

Nord. JordbrForsk. 1953 : 35 : 97-100.
The methods adopted in Denmark (cf. *PBA*, Vol. XXIII, Abst. 1780) and in Norway for testing clovers and various grasses, separately or in mixtures, in official trials and in layouts

of breeding material are explained in detail. Ö. Nissen deals with timothy strain testing, considered from the statistical aspect.

371 Oklahoma's Midland Bermuda shrugs off winter injury.

Sth. Seedsman 1953 : 16 : No. 7 : 44, 53.
Midland, a new variety of Bermuda grass bred at the Oklahoma Agricultural Experiment Station from a cross between Coastal and a winter-hardy strain from Indiana, possesses all the desirable qualities of Coastal and, in addition, recovers much sooner from winter injury. Its main attraction is its vigorous spring growth. Average forage yields at Stillwater, Okla., from 1949 to 1951 were 7157 and 5729 lbs. dry matter per acre for Midland and Coastal, respectively.

**372 KALTON, R. R. & WILSIE, C. P.
Effect of brome grass variety on yield and composition of a brome-alfalfa mixture.**

Agron. J. 1953 : 45 : 308-11.
Six varieties of smooth brome grass were sown with the lucerne Ranger, and tested for total forage yield and component yields of brome grass and lucerne for a four-year period at the Iowa Agricultural Experiment Station. Each year the total yields of first cuttings differed significantly according to the brome grass variety. No varietal differences occurred in total yield of the second cutting in any year, or in degree of competition with lucerne. The results showed that, for breeding purposes, the total yields from first cuttings of mixtures of brome grass and lucerne provide a fairly reliable indication of the yield potentialities of brome grass varieties.

**373 BEDDOWS, A. R.
The ryegrasses in British agriculture.**

Bull. Ser. H. Welsh Pl. Breed. Sta. 1953 : No. 17 : Pp. 81.

This general survey presents an account of the position of *Lolium perenne* and *L. italicum* in British agriculture and includes sections on the history, development, variation and varieties of both species.

The Welsh Plant Breeding Station's achievements in developing new strains of *L. perenne*, such as S.23, S.24 and S.101, are mentioned and reference is made to experiments with hybridization.

374 Australian winter grazer—Wimmera ryegrass likes semi-arid regions.

Sth. Seedsman 1953 : 16 : No. 8 : 32, 60.
Wimmera, a strain imported from Australia,

has proved more capable of withstanding drought in Texas than other ryegrasses. Its susceptibility to rust in a humid environment is not a drawback in semiarid regions.

**375 HENRY, T.
El *Lolium multiflorum* "La Estanzuela 284". (The variety La Estanzuela 284 of *L. multiflorum*).**

Arch. Fitotéc. Urug. 1952 : 5 : 231-35.
The strain described was selected from a Brazilian population; it is distinguished by high yield of green matter in the early, cool season of the year, erect habit, good seed production and reseeding capacity, and resistance to green aphid (*Schizaphis graminum*) and other ailments, including a certain degree of resistance to *Puccinia coronata*. It is tolerant of a wide range of soil conditions and gives a tolerable yield even in the poorest sandy soils.

**376 KRUPKO, S.
Karyological studies and chromosome numbers in *Hyparrhenia aucta* and *H. hirta*.**

J. S. Afr. Bot. 1953 : 19 : Pt. II : 31-58.
The chromosome number of *H. aucta* was found to be $2n = 20$, the basic number probably being 10. Two strains of *H. hirta* were discovered growing in Transvaal, one with $2n = 30$, and another with $2n = 44$. In this species x is probably 15. At least two lines of development have therefore apparently occurred in the genus. The partial sterility of the pollen in the monosomic triploid strain of *H. hirta* was chiefly due to the formation of laggards during metaphase I of meiosis, degeneration, and the occurrence of grains with supernumerary nuclei. In view of the possible importance of the genus *Hyparrhenia* for soil conservation purposes in Africa, extensive cytological and other studies of the different species are advocated.

**377 V.
Piper Sudan grass found resistant to leaf blight.**

Seed World 1953 : 72 : No. 11 : p. 30.
In recent trials in Rhode Island the Sudan grass Piper (cf. *PBA*, Vol. XXI, Abst. 2669) has exhibited a high degree of resistance to leaf blight (*Helminthosporium turcicum*).

**378 RAMÍREZ DE HERNÁNDEZ, A.
Observations on the chromosome number of *Pennisetum ciliare*.**

J. Agric. Univ. P.R. 1953 : 37 : 161-70.
Strains of buffel or anjan grass (*P. ciliare*) studied at the Agricultural Experiment Station,

University of Puerto Rico, were found to be tetraploid ($2n = 36$), except for one hexaploid ($2n = 54$). Since this grass is highly resistant to drought, further cytological studies are to be carried out to determine the possibilities of its use in crosses with tall and more leafy species of *Pennisetum*.

379 **Blue Buffel—the new blue chip grass.**

Sth. Seedsman 1953 : 16 : No. 9 : 20, 65.

A new variety of *Pennisetum ciliare*, Blue Buffel, is described. It produces a high yield of hay and has an extensive rhizome growth, its seed germinates readily and it is highly resistant to grazing and drought.

380 HIRAYOSHI, I.

(Distribution and chromosome numbers of *Leersia*).

Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : p. 220. (Abst.). [Japanese].

Notes are given on the distribution in Japan, chromosome numbers and fertility of species and varieties of *Leersia*. The basic chromosome number of the genus is $x = 12$, but $2x$, $4x$, $5x$ and $8x$ caryotypes occur.

381 STEBBINS, G. L. (Jun.) & FUNG TING PUN.

Artificial and natural hybrids in the Gramineae, tribe Hordeae. V. Diploid hybrids of *Agropyron*.

Amer. J. Bot. 1953 : 40 : 444–49.

At Davis, Calif., a study of meiotic configurations in crosses between two North American diploids, *A. spicatum* and *A. spicatum* var. *inerme*, and in hybrids of the diploid *A. caespitosum* from southwestern Asia crossed with *A. spicatum* var. *inerme*, has revealed a high degree of homology between chromosomes of all three species. The presence in some sporocytes of 2–4 lagging univalents and fragments resulting from bridge formation in hybrids involving *A. caespitosum* indicates that this species is less closely related to the North American diploids; hybrids between the latter generally exhibit normal meiosis. The assumption that *A. caespitosum* is heterozygous for inversions is made. It is considered that a genome consisting of chromosomes essentially homologous with those of the North American diploids is widespread in the north temperate regions, both among diploid species and as a component of many polyploids of *Agropyron* and related genera.

LEGUMINOUS AND OTHER FORAGE PLANTS

382 GRABER, L. F.

Registration of varieties and strains of alfalfa, II.

Agron. J. 1953 : 45 : 330–31.

The origin and characteristics of the lucerne variety Narragansett, recently registered in the United States, are described (cf. *PBA*, Vol. XXI, Abst. 1908).

383 MALYGIN, JU.N.

(Varietal trials with lucerne).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 48–53. [Russian].

Moršanskaja 81 and Kazanj 36 proved the most productive varieties in recent trials in the Moscow province. Mention is made of a new variety Severnaja Gibrdnaja 69 [Northern Hybrid 69] bred at the USSR Forage Institute, which was not included in the trials.

384 SKAARE, S.

Valg av lusernestamme. Grimm—Du Puits? (The choice of strains of lucerne. Grimm or Du Puits?) Samvirke 1953 : 48 : 131–32.

Trials in Norway have shown Du Puits to be a variety worth growing there, though it is not so hardy as the North American strains of Grimm and also yields slightly less. Since it grows fast and is rather coarse, its quality readily deteriorates owing to the increase in fibre and the decrease in protein content that occur as growth proceeds. It should therefore be cut earlier than the Grimm strains.

385 ODLAND, T. E. & SKOGLEY, C. R.

The origin of Narragansett alfalfa.

Agron. J. 1953 : 45 : 243–45.

The complex ancestry of Narragansett lucerne, developed at the Rhode Island Agricultural Experiment Station, is outlined (cf. *PBA*, Vol. XXI, Abst. 1908).

386 **Vernal alfalfa, new hardy variety.**

Seed World 1953 : 73 : No. 4 : p. 8.

Vernal lucerne, bred at the Wisconsin Agricultural Experiment Station, is described. Developed over twenty-two years from a cross between a wild European variety and a wilt-resistant strain of Wisconsin Cossack alfalfa, it gives a high yield, superior to that of most current commercial varieties, is resistant to frost and to bacterial wilt, and competes well with brome grass in mixed sowings. It is

considered to be a promising new variety for certain of the northern states of the USA (cf. *PBA*, Vol. XXIII, Abst. 2008).

387 MALCOLM, D. R.

Host relationship studies of *Lygus* in South Central Washington.

J. Econ. Ent. 1953 : 46 : 485-88.

Lygus bugs showed preference for certain varieties of lucerne. Of the 16 varieties studied, Ranger, Wisconsin Syn. C and South Dakota 12 supported the highest populations; the lowest populations occurred on Hardistan, Turkistan and Nemastan.

388 SACHS, E.

Einige amerikanische Luzernesorten in ihrer Leistung unter unseren Verhältnissen. (Some American varieties of lucerne and their performance under our conditions).

Z. PflBau 1953 : 4 : 111-21.

Local Franconian hybrid varieties proved superior in yield, protein content and resistance to mildew to all nine American varieties of *Medicago sativa* and *M. media* with which they were compared in trials of both pure sowings and mixed fodder crops. In experiments carried out over 17 years it was shown that the predominance of a type of flower with greenish, yellow and white hues is an indication of higher yield in local *M. media* varieties.

389 Å., E.

Framstående fröodlingar i Skåne. (Outstanding seed plots in Skåne).

Lantmannen, Stockholm 1953 : 37 : 711-12.

The participants in a seed production course had the opportunity of observing the superiority of French lucerne which outyielded other strains by 25%, though in other districts, e.g. central Sweden, it appeared deficient in overwintering capacity.

Addresses on plant breeding included references to work on the value of induced mutations of barley, wheat, sweet lupin, herbage grasses and potatoes. The problem of growing tetraploid and diploid strains near each other was also mentioned, the main difficulty being the faster rate of growth of diploid pollen.

390 SCHEIJGROND, W., Vos, H. & ZIKKEN, H.

The choice of lucerne varieties in the Netherlands.

Netherlands J. Agric. Sci. 1953 : 1 : 175-85.

The results of variety trials of lucerne are given,

together with data on yield, winter hardiness, speed of regrowth after winter, time of flowering and dry matter and crude protein content. A classification of varieties according to their order of recommendation is included.

391 VAN BOGAERT, G. & VAN SLIJCKEN, A.

Le choix variétal de la luzerne. (The choice of varieties of lucerne).

Rev. Agric., Brux. 1953 : 6 : 777-92.

In small-scale trials the indigenous Belgian strain Harmignies was compared with varieties from France, Luxemburg, Italy, Germany, New Zealand, Canada and the USA.

Varieties recommended on the basis of the results are Du Puits and Harmignies, which since 1950 has been in use as breeding material at the National Research Station for Plant Breeding at Melle, Belgium.

392 STURKIE, D. G.

New and better alfalfa for Dixie.

Sth. Seedsman 1953 : 16 : No. 8 : 14, 66.

The characteristics of each of the following lucerne varieties suited to the southern United States are outlined: Buffalo, Atlantic, Williamsburg, Narragansett (cf. *PBA*, Vol. XV, Abst. 645, Vol. XVIII, Abst. 255 and Vol. XXI, Abst. 1908), the French variety Du Puits, and Wisconsin Synthetic C, which embodies many of the lines in Vernal (cf. *PBA*, Vol. XXIII, Abst. 2008).

393 SANDAL, P. C.

Performance of reseeding crimson clover in Arkansas.

Arkans. Fm Res. 1953 : 2 : No. 2 : (unpaginated).

Trials of new varieties of reseeding crimson clover were held over a period of four years to compare hay yield and time of maturity. Mississippi selection, a late-maturing variety, and Auburn Reseeding and Dixie, both medium-maturing varieties, gave the highest yields.

394 WEXELSEN, H. & JULÉN, G.

Nyare erfarenheter om polyploida klöverstammar. (Recent experience regarding polyploid clover strains).

Nord. JordbrForskn. 1953 : 35 : 95-97.

In experiments in 1951 at the Norwegian Institute for Genetics and Plant Breeding, tetraploid red clover families exceeded the diploid control variety Molstad in yield of hay by 38-83%. The tetraploid stand in 1952, was considerably better than that of the control, which was much less resistant to *Sclerotinia trifoliorum*. In a seed-production test, eight tetraploid families gave a relative total yield

(seed and straw) of 104–137% compared with the diploid Molstad. The best tetraploid families yielded 34.8 kg. seed per dek., and the worst 15.2 kg. No ill effects on the set of the seed were observed in tetraploids growing in the vicinity of diploids. The degree of self sterility seems to be practically the same as in the diploid.

In Sweden, work with tetraploid clover strains, red and Alsike clover in the first instance, has been carried out at the plant breeding institutes at Svalöf and Weibullsholm with good results, as shown by the performance of the tetraploid red clovers Sv 034 and U 036 and the Sv 0205 strain of Alsike clover (cf. *PBA*, Vol. XXII, Abst. 988 and Vol. XXIV, Abst. 141).

Experiments at Svalöf have shown that the individual plants derived from the primary tetraploid material vary greatly in fertility, and that fertility increases considerably after a few generations. Selection for fertility has proved effective.

Possible embryological and other causes of the lower fertility in tetraploid clover are briefly considered.

395 SHUEL, R. W.

The effect of some environmental factors on nectar secretion in red clover.

Abstr. Doct. Diss. Univ. Ohio 1950–51 (1953) : No. 64 : 493–98.

During an analysis of nectar production in relation to environment at the Ohio State University, the influence of genotype was noted. One clone consistently secreted a greater volume than others. Selection for high yields of nectar may therefore be a feasible method of increasing cross pollination and seed yield.

396 LUDWIG, R. A., BARRALES, H. G. & STEPLER, H.

Studies on the effect of light on the growth and development of red clover.

Canad. J. Agric. Sci. 1953 : 33 : 274–87.

The effect of light, particularly of photoperiod, upon the growth and development of the red clover Dollard was studied at MacDonald College, Quebec. Inherent variability in growth habit showed maximum expression under conditions of short day-length. Seedlings two months old, when exposed to day lengths of 8 hours during their second month, showed wide variability, and could be selected for mature growth habit. Corresponding plants receiving 16-hour photoperiods were morphologically uniform. In addition, clones exhibited marked

differences in growth habit when exposed to 8-hour photoperiods. Interclonal differences were shown in ability to survive under conditions of low light intensity; development of strains with improved adaptation to cultivation with a nurse crop should therefore be possible. A 14-hour photoperiod was the critical one for flowering in most clonal lines; two lines, however, required a 16-hour photoperiod. A 16-hour photoperiod induced earlier and more profuse flowering than a 14-hour one in all but two of the clones. In the latter two, the reverse situation was observed. The duration of photoperiodic stimulation required to induce flowering varied according to the clonal line and age of the plant. Selection for uniformity in this respect should result in more uniform plant maturity and larger seed yield. Inadequate stimulation often resulted in abortive inflorescences, and might in practice be one of the causes of failure to set seed.

397 NOVODEREŽKINA, M.

(Varieties of perennial forage plants for the Non-Black-Earth Belt).

Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 6 : 56–58. [Russian].

A new, late, productive red clover, Moscow 1, interesting for its hardiness, was selected at the Institute of Grain Farming of the Non-Black-Earth Belt from a land variety originating from the Jaroslavl province. It yields 50–55 c. hay and 2.5–3 c. seed per ha. Several promising hardy grasses developed at the institute in recent years include a fescue, Moscow 62, which shows resistance to drought and lodging, an *Alopecurus* variety, Moscow 1409, tolerant of pests and diseases, a *Dactylis* variety, Moscow 222, which produces 80% viable seed and timothy varieties Moscow 362 and Moscow 1480 which show resistance to diseases and the last named also to drought.

398 OYAMA, T.

The cytological significance of teratological leaves induced by X irradiation of white clover and of their reversion to the normal condition).

Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 33–37. [Japanese].

When young shoots of *Trifolium repens* are X-irradiated, cytological aberrations result together with various associated types of aberrant leaf. Reversion to normal leaf shape occurred along a definite sequence of leaf forms. Two non-revertible leaf mutants were also observed.

- 399 HOLLOWELL, E. A.
Registration of varieties and strains of crimson clover I.
Agron. J. 1953 : 45 : 318-20.

Dixie, a variety recently registered in the United States, is a composite in equal proportions of three similar, adapted strains known as Allen, Hardy and Thornton. It has the advantages of high yield and ability to produce good volunteer stands. It is recommended for most southern states.

- 400 VAN DEN EYNDEN, G. P. A.
Some aspects of the breeding of summer vetch (*Vicia sativa*).

Euphytica, Wageningen 1953 : 2 : 122-26.
Experiments in breeding small-seeded summer vetch are discussed, and different varieties compared. A new selection, CIV 27 W, developed from the recommended variety Civi, has extremely small seeds, high yield and requires a smaller amount of seeds per given area.

- 401 Ist der Anbau von Winterwicken heute noch zu vertreten? (**Is the cultivation of winter vetch still justified to-day?**)
Mitt. dtsch. LandGes. 1953 : 68 : 855-56.

Different varieties of winter vetch are compared as to yield, fodder value and percentage germination.

- 402 **Vetches for the wheat belt.**
Rur. Res. CSIRO 1953 : No. 3 : 12-14.

Trials were held over a period of three years at nine centres in Western Australia to determine which varieties of vetch were most suitable for planting in rotation with wheat. *Vicia articulata* proved the most satisfactory species in respect of yield, immunity to and tolerance of various insect pests, recovery after grazing, resistance to drought and ability to compete well with weeds. Two varieties of *V. articulata*, Lafayette and Monala, have been introduced into Western Australia.

- 403 HANSON, C. H.
Controlled hybridization in *Lespedeza stipulacea*.

Agron. J. 1953 : 45 : 333-34.
Cross pollination of emasculated buds of chasmogamous flowers resulted in less than 5% seed set. Cross pollination on nonemasculated buds gave 28.4 and 41.6% seed set in 1948 and 1949, respectively; the majority of the plants were hybrids. The average normal seed set of chasmogamous flowers was 62, 61 and 68%, respectively, for three years. Failure of emasculated flowers to set seed is attributed to injury.

- 404 WILKINS, H. L., BATES, R. P., HENSON, P. R., LINDAHL, I. L. & DAVIS, R. E.
Tannin and palatability in sericea lespedeza, *L. cuneata*.

Agron. J. 1953 : 45 : 335-36.
A study of progenies of three plants having inherently different contents of tannin has shown that the presence of tannin has a definitely adverse effect upon palatability. The progeny with high content of tannin was the least palatable to sheep, although it had the lowest content of crude fibre, the greatest leafiness and the highest content of crude protein.

- 405 BIDHAN CHANDRA DAS
Cytological and embryological basis for sterility in autotetraploid sweet-clover, *Melilotus alba* Desr.

Iowa St. Coll. J. Sci. 1953 : 27 : 537-61.
A study of megasporogenesis, embryo-sac development and embryology of autotetraploid *Melilotus alba* was made to determine the cytological and the morphological basis of self sterility.

Irregularities throughout meiosis, with frequent lagging and nonorientation of chromosomes, together with abnormalities in embryo and endosperm development, provide the physical basis for the eventual collapse of fertile ovules and the subsequent failure of seed production.

- 406 DU PLESSIS, S. J. & TRUTER, J. A.
Brown spot disease of lupins caused by *Pleiochaeta setosa* (Kirchn.) Hughes.

Sci. Bull. Dep. Agric. S. Afr. 1953 : No. 347 : Pp. 12.

Observations on the range and effect of *P. setosa* led to the conclusion that the blue lupin, *Lupinus angustifolius*, was less susceptible than the white lupin, *L. albus*.

Of four varieties of white lupin grown on heavily infected plots, the Portuguese white lupin suffered least.

- 407 DEL GAUDIO, S.
Ricerche sui consumi idrici e indagini sull'autofertilità del fieno greco. (Researches on water consumption and investigations on self fertility in fenugreek).

Ann. Sper. Agr. 1953 : 7 : 1273-87.
The investigations showed that the seeds retained their viability better when kept in the pods than when shelled.

Seed was set when the entire plant was bagged but the number and size of pods and the number of seeds produced were less than in control plants grown in the open.

- 408 PETERSON, M. L., JONES, L. G. & OSTERLI, V. P.
Birdsfoot trefoil in California.
 Circ. Calif. Agric. Exp. Sta. Ext. Serv.
 No. 421 : Pp. 15.

Particulars are presented of the uses and method of cultivation of *Lotus tenuis*, *L. corniculatus* and *L. uliginosus*, and detailed data on the varieties Granger, Cascade, Empire, Viking, Beaver and Columbia are given.

- 409 MAYMONE, B., PETRUCCI, E. & TIBERIO, M.
 Ricerche sulla produttività e sul valore nutritivo di una Polygonacea della flora spontanea, resistente alla siccità: *Polygonum romanum* Jacq. (**Research on the productivity and nutritive value of a wild drought-resistant member of the Polygonaceae, *P. romanum* Jacq.**).
 Ann. Sper. Agr. 1953 : 7 : 647-73.

A full description is given of this Mediterranean species and of experiments carried out to determine its yielding ability, chemical composition, digestibility by sheep and general nutritive value, all of which point to its being a useful fodder plant for arid zones.

ROOTS AND TUBERS

- 410 OPSAHL, B.
 Valg av rotvekststammer. (**The choice of strains of root crops**).
 Samvirke 1953 : 48 : 122-23.

In recommending varieties and strains of turnips, swedes, mangels and sugar mangels to Norwegian farmers, the author compares some Swedish and Danish varieties tested in Sør Østlandet with reference to yield of roots and tops, dry matter content and the ease with which lifting can be carried out.

- 411 **Fodder beet variety trials.**
 Mon. Rep. Minist. Agric. N. Ire. 1953 : 28 : 176-77.

The three varieties, Pajbjerg Rex X, Red Øtofte X and Hunsballe X, tested at several centres in N. Ireland during 1951 and 1952, all gave satisfactory yields in terms of either dry matter per acre from the roots or yield of dry matter from the total crop. Hunsballe X contained a higher percentage of dry matter in the roots than the other two varieties, but produced a lower root yield. This variety tended to produce fanged roots and an extensive fibrous root system; Pajbjerg Rex X also had the latter disadvantage.

- 412 FLOVIK, K. & OPSAHL, B.
 Forsøk med sorter og stammer av nepe 1947-1951. (**Trials with varieties and strains of turnips, 1947-51**).
 Forskn. Fors. Landbr. 1953 : 4 : 121-42.

Trials of ten late and eight early varieties and strains, produced by Norwegian, Danish and Swedish breeders, were carried out at various research centres in Norway. Yields of roots and of dry matter, disease and pest resistance and dry matter content of the roots are analysed in detail to show the performance of the varieties in the different districts.

The Norwegian variety Kvit Mai [White May], bred at the Forus Experimental Station, outyielded all other strains in the Trondheim and Steinkjer areas. It is also highly resistant to *Plasmodiophora brassicae*, to which Weibull's Immuna II (cf. *PBA*, Vol. XVI, Absts. 602 and 1303) is also resistant. The Yellow Tankard strains, Vidarshov I and Roskilde IX are more resistant than the Bortfelder strains to *Cortophila* sp., which attacked Kvit Mai severely.

- 413 KATINJARCEV, L. V. & IVANOVA, L. I.
 (**The potato variety Sibirjak**).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 47-50. [Russian].

At Omsk, Sibirjak [Siberian] outstripped all other early and midseason varieties in yield, in seasons with normal or subnormal rainfalls, but was less productive than Berlichingen and Lorch in unusually wet years because of its susceptibility to *Phytophthora*. In the Tomsk and Tjumenj province Sibirjak also outyielded other varieties.

- 414 **American Potato Yearbook 1953** : Pp. 80.

Following the lines of previous issues, the yearbook gives up-to-date information on potato production in the United States, including breeding projects (cf. *PBA*, Vol. XXII, Absts. 500 and Vol. XXIII, Absts. 442).

- 415 OKUNO, S.
Cytological studies on potatoes, with some remarks on genetical experiments. Part I and II.

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 79-103; 1952 : 27 : 3-21.

Cytological investigations were carried out on *Solanum tuberosum*, *S. rybinii*, *S. phureja*, *S. andigenum*, *S. curtilobum* and 14 wild species and forms at the Biological Institute, Utsunomiya University, Japan. Meiosis in the wild species was generally regular, except in *S. maglia* and *S. commersonii*, which are regarded as hybrid triploids ($2n = 36$) from $4n \times 2n$

crosses, and in *S. demissum*, f. *atrocyaneum* ($2n = 60$). The 32 varieties of *S. tuberosum* examined were classed into five groups on the basis of meiotic behaviour. Meiosis in forms described as a diploid and triploid of *S. tuberosum* was also investigated. Observations on secondary associations in the $2n$ form suggest that the basic chromosome number of *Solanum* is $x = 6$. Further support to this hypothesis is given by the meiotic behaviour of *S. demissum* $\times$ *S. tuberosum* hybrids, in which multiple plates containing groups of six bivalents or univalents were frequently observed.

Among approximately 700 individuals of *S. tuberosum*, three aneuploids were discovered ($2n = 46, 47$ and 49). F_2 aneuploids of *S. demissum* $\times$ *S. tuberosum* showed no relationship between chromosome number and tuber or seed production. Aneuploids were also produced from a diploid form of the cultivated potato by exposure of seeds to -25°C for 6 months.

Diploid *S. tuberosum* plants, normally regular in meiosis, showed abnormalities in microsporogenesis, such as fragments and asynapsis, as a result of a low temperature treatment of -10°C for 3–12 hours.

In experiments on the possible causes of sterility, fructification in *S. tuberosum* and wild species did not occur at an air temperature higher than approximately 20°C . Pollen abortion resulting from abnormal meiosis is not regarded as the chief cause of unfruitfulness; environmental conditions, inducing various physiological disturbances, are considered to be of greater importance.

Frost resistance and time of maturity in hybrids between *S. demissum* and *S. tuberosum* both appeared to be monogenically inherited. Yellow colour of the tuber flesh in *S. tuberosum* was monogenically determined, and dominant to white. Tuber colour is explained on the basis of the interaction of two factor pairs, *Aa* and *Bb*. Purple and red tubers have the genotypes *AB* and *Ab*, respectively; white tubers possess the genes *aB* or *ab*. Male sterility in a plant whose pollen, almost normal in amount, was arrested in development, probably depended upon two recessive genes, *ms*₁ and *ms*₂.

416 RATERA, E. L.

Número de cromosomas de algunas Solanáceas argentinas (Tercera contribución). [Chromosome number of some Argentine Solanaceae (Part III)]. Rev. Fac. Agron. B. Aires 1952 : 13 : 280–84.

The nine species reported include four *Solanum*

species, viz. *S. adventitium*, *S. pygmaeum*, *S. pyrethrifolium* and *S. radicans*, all with $n = 12$.

417 ALLISON, R. M. & DRIVER, C. M.

The effect of variety, storage and locality on the ascorbic acid content of the potato tuber.

J. Sci. Fd Agric. 1953 : 4 : 386–96.

In two successive years, the tubers of 20 varieties grown in New Zealand were analysed for ascorbic acid content when harvested, and at monthly intervals during storage in a commercial type of clamp. The varieties exhibited significant differences in ascorbic acid content at harvest, and also differential behaviour with respect to loss of ascorbic acid during long storage. After storage for five and a half months, the ascorbic acid content increased in the majority of varieties. This rise is discussed in relation to temperature variations, sampling methods and metabolism during storage.

418 STERTEN, A. K.

Potetforsøk i fjellbygdene 1941–1947. (Potato trials in the highlands, 1941–47).

Forskn. Fors. Landbr. 1953 : 4 : 81–120.

The results of trials at Løken in Norway are recorded, with particulars regarding the effects of pregermination upon performance.

In most years Ås (Hindenburch $\times$ Centifolia-15) gave the highest yield and was among the best varieties as regards yield of dry matter, though a higher dry matter content would be desirable. It is recommended as a table and fodder variety for the lower-lying districts and the valleys. It is immune to wart disease, resistant to *Phytophthora* and shows no symptoms in the presence of weak strains of virus X.

Saga (Sagerud $\times$ Richter's Jubel-208) also ranked high in regard to yield of tubers and dry matter and its dry matter content was satisfactory. It is wart immune, reacts like Ås to weak strains of virus X and also shows no clear symptoms in the presence of virus Y. Its tubers are resistant to late blight. It is a good early table and fodder variety for the highlands.

419 SIEBENEICK, H.

Wichtig für Einkellerungskartoffeln: Keimträgheit. (Slow germination, an important factor in potatoes for storage).

Mitt. dtsh. LandwGes. 1953 : 68 : 948–49.

Fifty-seven varieties of potato were compared as to tendency to early sprouting when in storage. The results are tabulated, the variety

Apta having the longest period of dormancy. It is suggested that greater attention be paid to this factor in future breeding programmes.

- 420 RADŽABLI, I. D. & RADŽABLI, E. P.
(**Sowing potatoes in the summer with previously harvested tubers**).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 7 : 66–67. [Russian].

Several domestic varieties of potato and some hybrids, interesting for their short dormancy periods, produced high tuber yields when sown in summer under Azerbaïdžan conditions. The hybrids Apatite 2/32 from (Epicure x *Solanum boyacense*) x Katahdin 1173, RK-114 from Granat [Pomegranate] x *S. kesselbrenneri*, RK-80 from Early Rose x *S. caniarenses*, and Hibinskii Dvyhurožainyi [Hibiny Two Harvests] yielded 13.4–18.2 tons per ha, when sown with vernalized tubers and 13.2–21.5 tons when sown with untreated material.

- 421 OKUNO, S.
(**On a case of heritable male sterility observed in the potato**).

Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 107–10. [Japanese].

A male-sterile female-fertile potato was discovered, which gave a 3:1 segregation for fertility: male sterility in the F_2 of some crosses and a 15:1 ratio in others. These results suggest that male sterility is determined by the combined action of two recessive genes, for which the symbols ms_1 and ms_2 are proposed.

- 422 IVANČENKO, G. Z. & IVANČENKO, E. A.
(**Using sterile potato varieties as pollinators**).

Agrobiologija (Agrobiology) 1953 : No. 3 : 154–55. [Russian].

Mičurinite methods of improving the pollen fertility of Ostbote, which is noted for its resistance to wart and its starch content, but gives mostly sterile pollen under Moscow conditions, included vegetative hybridization and the use of pollen mixtures. Some seed was obtained when Lorh was grafted on tomato or on potato 3000 c/44 and pollinated with the pollen of potato hybrid Ostbote on K-1711. The pollen fertility of Ostbote was also improved by grafting it on Oktjabrenok [Little Octobrist]. No seed was set when Lorh was pollinated with the pollen of Ostbote or 3000 c/44, but some seed was formed when the pollen of 6646 c/45 was used and still more when Lorh was pollinated with mixed pollen of the above varieties.

- 423 **The change in the classification of Dutch seed potatoes.**

Windmill, The Hague 1953 : No. 11 : p. 5. (also in French, p. 4; German, 8–9; and Spanish, p. 9).

An account is given of the reclassification of Dutch seed potatoes for export. The standard required for Classes A, B and C has been raised, Class AB abolished, and Class E, consisting of high-quality progeny seed from clonal selection, material previously prohibited for export, has been introduced. Clonal selection has become the basis for seed potato cultivation in the Netherlands.

- 424 TOXOPEUS, H. J.

(**On the significance of multiplex parental material in breeding for resistance to some diseases in the potato**).

Euphytica, Wageningen 1953 : 2 : 139–46.

The genetics of inheritance of resistance to disease and the technique of breeding resistant varieties are discussed. Breeding for resistance to *Heterodera rostochiensis* has begun, resistant material of *Solanum andigenum* being employed.

- 425 GROVER, O. & TURNQUIST, O. C.

(**"Redburt": a new potato variety**).

Amer. Potato J. 1953 : 30 : p. 186.

The new potato variety Redburt, a selection from the variety Satapa, is described. Its yield is satisfactory and it is well suited for mechanical harvesting.

The tubers are of a deeper red colour and more elongated than in Satapa.

- 426 DOBRODEEVA, A. L.

(**The potato varieties for cultivation under irrigation**).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 45–46. [Russian].

Volžanin [Volga], Oktjabrenok [Little Octobrist], Uljanovsk and Seedling 1750–4 proved the most productive varieties tested on irrigated lands in the central Volga Basin. Of the varieties showing resistance to wart, high yields were recorded at Uljanovsk for Epron, Huma, Alba, Carnea and Grenzmark, all except Epron producing tubers with a high starch content.

- 427 BUREMA, S. J.

Verslag van een studiereis naar Zwitserland (27 Juni–5 Juli '53). [Report on a study tour of Switzerland (27 June–5 July '53)].

Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1953 : 10 : 38–39.

This record of a tour of Swiss research institutions

mentions that new varieties of potatoes, and especially those bred in Germany, such as Jacobi (cf. *PBA*, Vol. XXIII, Abst. 2784), are much less susceptible to *Phytophthora* and leaf roll; research at Lausanne on virus S is also mentioned (cf. *PBA*, Vol. XXIII, Abst. 2802).

- 428 STEVENSON, F. J. & AKELEY, R. V.
Control of potato diseases by disease resistance.

Phytopathology 1953 : 43 : 245-53.

Literature on the disease and insect resistance of wild *Solanum* spp. is surveyed, and a general discussion is given of the genetics of resistance in *S. tuberosum*. An account is then provided of past and present work on breeding for resistance to the following diseases and on the inheritance of resistance, mainly with reference to investigations in the United States: virus diseases, late blight, scab, wart, *Verticillium* wilt, ring rot, bacterial wilt or brown rot, black-leg and hopperburn. One of the chief objectives of breeding at present is to combine in one variety resistance to several diseases; seedlings have been developed possessing resistance to two to five major diseases.

- 429 OKUNO, S.
(The genetics of frost resistance and maturation period in the potato).
Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 137-40. [Japanese].

The F_1 of crosses between *Solanum tuberosum* (early maturing and frost sensitive) and *S. demissum* (late maturing and frost resistant) was intermediate in its maturation period and degree of frost sensitivity. Though the F_1 is not very fertile, 674 F_2 plants were raised and these showed a complete range, in respect of the two characteristics studied, between the parental reactions. Some indication was obtained of a monogenic basis for frost resistance and maturation period.

- 430 HOWARD, H. W.
Physiological races of *Phytophthora infestans* : a comparison of the differential hosts at the Plant Breeding Institute, Cambridge, with those of the Scottish Society for Research in Plant Breeding.

Ann. Appl. Biol. 1953 : 40 : 584-93.

The three physiological races of *Phytophthora infestans* recognized at the Plant Breeding Institute, Cambridge and designated A, B and C were compared with the five races, A, B¹, B², C and D of the Scottish Society for Research in Plant Breeding, Edinburgh. The Cambridge

races, A, B and C correspond to the Scottish races, A, B¹, and C respectively.

The identification and origin of physiological races of blight and the breeding of disease resistant potatoes are discussed. The new variety Pentland Ace is the only variety field immune to all three Cambridge races. It is suggested that new resistant varieties would be more valuable if they incorporated other types of resistance besides the hypersensitive type of immunity since in this case it should take a longer time for any new race of blight to become abundant.

- 431 NIEDERHAUSER, J. S. & MILLS, W. R.
Resistance of *Solanum* species to *Phytophthora infestans* in Mexico.

Phytopathology 1953 : 43 : 456-57.

Particularly virulent races of *Phytophthora infestans*, to which all wild species of *Solanum* are susceptible, were found in the Toluca valley. It is thought that the virulent races will eventually appear wherever resistant varieties are developed, in which case the performance, amounting to tolerance, of these wild species in their native environment is probably the maximum level of resistance that can be achieved from these sources. It is suggested that if the high level of resistance present in some clones of *S. demissum* can be incorporated into a commercial potato, this comparative resistance would prove of great value.

- 432 Bericht over rassenkeuze, No. 147.
Aardappels, 1953 (interprovinciale proefvelden). [Report on variety selection, No. 147. Potatoes, 1953 (interprovincial experimental fields)].
Landbouwwoorlichting 1953 : 10 : Bijl. 13 : 1-6.

Particulars are given of variety trials of edible, fodder, processing and export potatoes. Among new varieties tested Barima, Prinslander, Irene, Sientje and Noordstar had high yields, and Gineke, Irene and Pimpernel were superior in quality. Gineke and Pimpernel are drought resistant. Froma and Irene are comparatively resistant to *Phytophthora*.

- 433 Bericht over rassenkeuze, No. 148.
Aardappels, 1953 (observatieproefvelden). [Report on variety selection, No. 148. Potatoes, 1953 (observational test fields)].
Landbouwwoorlichting 1953 : 10 : Bijl. 14 : 1-4.

Particulars of field tests of 20 new varieties of potato are given. Stol 4415, Mulder V 16 and

Maritta gave high yields, and were of good quality. The latter two varieties were comparatively resistant to *Phytophthora*.

- 434 GERN, A. P.
(A new potato variety, Hybrid 42, showing resistance to *Phytophthora*).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : 37-42. [Russian].

Hybrid 42 was obtained at the Petrovskaja State Breeding Station by pollinating *Solanum demissum* var. *xitlense* with some domestic potato varieties and by crossing the resultant F_1 with the variety Seydlitz and the first generation thereof with Pepo. It is a productive midseason variety with large white tubers of good flavour. It shows resistance to various diseases, including a high degree of resistance to wart and *Phytophthora*.

- 435 ZUBČENKO, A. A.
(The introduction of wart-resistant potato varieties in the zones in which alcohol-making plants of the Ukrainian SSR are located).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 8 : 57-59. [Russian].

At Kiev, the productiveness and starch content of some wart-resistant varieties have been improved. Several early, midseason and late varieties, made standards as a result of recent resistance tests, are listed, together with certain new promising varieties still under trial.

- 436 ADAMOV, I. I.
(Growing seed potatoes in White Russia).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 8 : 54-57. [Russian].
Some wart-resistant varieties cultivated in White Russia are named. Reference is made to two new early varieties, Priekul'skii and Laïma, which are still under trial.

- 437 HOFFERBERT, W., ORTH, H. & PUTLITZ, G. ZU
Unsere Arbeiten zur *Rhizoctonia*-Frage bei der Kartoffel. (Our work on the *Rhizoctonia* question in the potato).
Z. PflKrankh. 1953 : 60 : 385-97.

Several methods are described for the artificial infection of potatoes with *Rhizoctonia solani*. Resistance to the disease depends upon a number of factors: initial vigour and earliness of growth, number of shoots and roots, and power of regeneration. Environmental and climatic conditions play a considerable role. The selection of resistant types is discussed.

- 438 MACLACHLAN, D. S., LARSON, R. H. & WALKER, J. C.
Strain interrelationships in potato virus A.
Res. Bull. Univ. Wis. 1953 : No. 180 : Pp. 36.

Potato virus A was studied in relation to differential hosts, transmission, strains and reaction of different potato varieties.

The varieties Irish Cobbler, British Queen, Up-to-Date, Kennebec, Katahdin and Sebago are field immune to virus A.

- 439 HUTTON, E. M. & BROCK, R. D.
Reactions and field resistance of some potato varieties and hybrids to the leaf-roll virus.
Aus. J. Agric. Res. 1953 : 4 : 256-63.

The reactions and resistance of a number of potato varieties and hybrids to infection by leaf-roll virus were studied over several years. It was shown that Bismark, though capable of carrying the disease, displayed no symptoms and possesses the highest resistance of all varieties tested. This resistance was due apparently to some virus-inactivating mechanism which reduces field infection and also prevents the transmission of the disease to a proportion of the tubers of infected plants. The characteristic was transmitted to some of the hybrids obtained by crossing Bismark with susceptible varieties.

- 440 DEARBORN, C. H., BABB, M. F. & KALLIO, A.
Knik, a new potato variety for Alaska.
Amer. Potato J. 1953 : 30 : 148-49.

A new variety of potato, Knik, selected from a cross between Arctic Seedling and 56-1, has been released. Knik is of good quality, possesses a smooth clear light-cream skin, and produces a high yield of large tubers which keep well. It is comparatively resistant to scab.

- 441 WOODCOCK, E. F.
The correlation between the number of lenticels on potato tubers and susceptibility to the potato-scab organism [*Streptomyces scabies* (Thaxt.) Waksman and Henrici].
Pap. Mich. Acad. Sci. 1952 : 38 : 109-11.

Although it has been suggested that the pathogen enters the tuber by means of the lenticel, the results of counting lenticels on 100 tubers of each of six varieties, grown commercially in the United States, have shown no correlation

between scab susceptibility and number of lenticels.

442 EMILSSON, B.

The relation between content of chlorogenic acid and scab resistance in potato varieties.

Acta Agric. Scand. 1953 : 3 : 328-33.

From a study of 16 varieties at the Institute for Plant Research and Cold Storage, Nynäshamn, Sweden, no relationship could be established between scab resistance and content of chlorogenic acid in the tuber skin (cf. *PBA*, Vol. XXII, Abst. 2822).

443 Vorsicht bei der Ernte krautfäulegeschädigter Kartoffeln! (**Take care in harvesting blight infected potatoes!**)

Schweiz. landw. Z. 1953 : 81 : 890-91.

An announcement by the federal agricultural experimental station at Zürich-Oerlikon lists the variety Robusta as being resistant to *Phytophthora*, and the varieties Böhm's Allerfrüheste Gelbe [Böhm's Very Early Yellow], Centifolia, Erdgold [Earth Gold], Frühbote [Early Messenger], Ideaal, Jakobi, Sabina and Voran as being comparatively resistant.

444 **Potato variety trials.**

Mon. Rep. Minist. Agric. N. Ire. 1953 : 28 : 175-76.

The following main-crop varieties were tested at 14 centres during 1952 in N. Ireland: Arran Banner, Ulster Supreme, Majestic, Stormont Dawn and Arran Peak. Combining the results of 1952 with those for the previous six years, Arran Banner and Stormont Dawn have proved to be the highest yielding on the average.

445 DÍAZ DE MENDÍVAL Y VELARCO, J. M. & ESCRIBANO ISAVA, F.

Ensayos sobre patata realizados durante el período 1944 a 1948. (Tests on potatoes carried out during the period 1944 to 1948).

An. Inst. Invest. Agron., Madr. 1953 : 2 : 227-341.

Experiments were made to test the influence of tuber size and spacing on yield in a number of different varieties. Detailed results are also presented of tests with a number of varieties and hybrids, both Spanish and introduced, of early, mid-early and late potatoes tested in a large number of centres in different parts of Spain.

446 BRÜCHER, F. J., FOLQUER, F. & PLOPER, J.

Características y rendimientos de 16 variedades de batata en Tucumán. (Characteristics and yield of 16 varieties of sweet potato in Tucumán).

Publ. Fac. Agron. Univ. Tucumán 1952 : No. 611 : Pp. 29.

Descriptions are given of the four main varieties grown in the Tucumán province of Argentina, together with two less common varieties and certain others introduced from abroad. Cooking quality, chemical composition and yielding capacity were taken into consideration as well as morphological features. The most popular variety, Brasilera Blanca [White Brazilian] is surpassed in yielding ability by some of the introduced varieties, which are also more regular in tuber shape and generally earlier in maturity, the most promising being Unit 1 Porto Rico, Texas 51, Nancy Hall, Kansas 40 and B-4306.

447 SINGH, H. B.

Sweet potatoes introduced from China.

Indian Fmg 1951 : 1 : p. 28.

SINGH, H. B.

Grow more sweet potatoes.

Ibid. 1953 : 3 : 24-25, 27.

The value and uses of the sweet potato are emphasized. Two Chinese white-skinned varieties of good eating quality, FA 17 (V 2) and Tie Shin Tun (V 12), have proved greatly superior in yield to local Punjab varieties. FA 17 is being propagated on a large scale for general distribution, having shown wide adaptability.

448 WERNER, H. O.

Sweet potatoes: a good crop for Nebraska.

Neb. Exp. Sta. Quart. 1953 : 1 : No. 4 : 14-15.

Data are presented on several new varieties of sweet potato combining earliness, ability to produce roots in cool weather and high food value. Ranger is especially suited to light soils, yields well, and has a high carotene and dry matter content. Orange Little Stem, Red Nancy, Orlis, Nancy Gold, All Gold and Heart-o-Gold are also good yielders and suitable for most parts of Nebraska.

- 449 MENEZES, O. B. DE
Melhoramento da batata doce. Florescimento e frutificação. (**Improvement of the sweet potato. Flowering and fruit formation**).

Ceres, Minas Gerais 1952 : 9 : 117-24.

Observations made on 66 varieties led to the conclusion that in Brazil the best time to effect emasculation was 16-00 hrs., pollination being performed at the same time the following day. Almost all varieties flowered well under the conditions of the State of São Paulo and produced fertile pollen, but very little seed set under conditions of self pollination. Sib crosses also failed to set seed and only a 2% set was obtained from crosses of *Ipomaea nihil* x *I. batatas*, the germinating power of the seeds produced being extremely low; the reciprocal of this cross set no seed.

- 450 ANDERSON, W. S. & CAMPBELL, J. A.
Allgold leads in test of five sweet-potato varieties.

Miss. Fm Res. 1953 : 16 : No. 2 : 1-2.

The results are given of sweet potato variety trials held at the Mississippi Experiment Station, together with detailed data on the leading varieties.

Allgold gave the highest average yield over a three-year period, followed by Goldrush and Georgia Bunch. Allgold and Goldrush have both shown resistance to stem rot, and Louisiana Experiment Station has reported that the latter variety also shows some resistance to soil rot.

- 451 FEAZELL, G. D.
Reaction of sweet potato varieties and seedlings to internal cork disease.

Phytopathology 1953 : 43 : p. 290.

In core-graft tests, the varieties Allgold and Pelican Processor were graded resistant to internal cork. Among the Louisiana seedlings studied, 9-18, 9-65, 9-65A and L-224 showed resistance. The roots of Allgold and Heartgold may behave as symptomless carriers, even after seven months in storage; Heartgold was rated as having an intermediate degree of resistance.

- 452 HUFFINGTON, J. M., GIGGARD, E. D., STEINBAUER, C. E. & WALLS, E. P.
Sweet potato varieties for canning.
Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 487-95.

Of commercially available sweet potato varieties, Jersey Orange, Orange Little Stem and Allgold are suitable for canning in syrup, and Jersey Orange and Big Stem Jersey for canning under

vacuum. A new variety, Sunnyside, shows considerable promise for canning both in syrup and under vacuum.

FIBRES

- 453 SIVARAMAN, M. S.
The Madras cottons.

Indian Cott. Gr. Rev. 1953 : 7 : 149-59.

A discussion is given of the Cambodia, Tinnevellys, Westerns, Northern and Cocanadas cottons, and their improvement by breeding and selection. In view of consumer demand for finer fabrics, and the loss to India, as a result of partition, of areas producing American cottons, adapted long-staple cottons are being developed.

- 454 **Progress Reports from Experiment Stations, season 1951-52.**

Emp. Cott. Gr. Corp. 1953 : Pp. 12.

The full version of these reports has been summarized already in *PBA*, Vol. XXIII, Abst. 2817.

- 455 BOZA B., T.
La producción de algodón en el Perú.
(**Cotton production in Peru**).

Segundo Congreso Nac. Ingen. Agrón. Sesión Mesa Redonda 24 Jul. 1952 : Lima, Peru.

In a general review of the cotton situation in Peru, reference is made to the Tangüis selections, which have a combination of lint length and ginning percentage better than any other cottons in the world; some are distinguished by extreme earliness and others by resistance to *Verticillium* wilt.

- 456 CANSECO B., O. D.
La fitotecnia en el mejoramiento del algodón. (**Plant breeding in the improvement of cotton**).

Agronomía, La Molina 1953 : 18 : 64-78.

The success of the classical breeding methods is illustrated by the production of the varieties Deltapine 14 and 15, and some of the more accelerated breeding methods applied recently in Texas are described. Reference is also made to work in progress in Texas on interspecific hybridization, using *Gossypium thurberi*, *G. harknessii* and *G. raimondii*. The opinion is expressed that further increase in earliness in Tangüis cotton can now be obtained only by hybridization with the early Upland varieties. A certain increase in heterozygosity would be advantageous to this variety if it were to confer a greater climatic adaptability and better

chances of selecting forms resistant to pests and diseases. Evidence is presented in support of the view that Tangüis is not a pure *G. barbadense*, as thought by Harland, but a product of hybridization with *G. hirsutum*, and reference is made to a population of the native *G. barbadense* cotton of Ecuador, Bolsa de Toro [Bull's Purse], the progeny of which showed clear signs of natural crossing with *G. hirsutum* of the Acala type. Thus the possibility of improving Tangüis by further crossing with *G. hirsutum* should not be excluded.

457 FIKRY, M. A.

Cotton breeding in Egypt. Its achievements, its limitations and suggestions for the future.

Bull. Un. Agric. Égypte 1953 : 51 : 49-54.

The author gives an account of results achieved in breeding cotton in Egypt. Ginning quality, earliness and fibre strength have been improved, but further work is required on lint length, boll setting, boll weight and natural resistance to insect attacks. The introduction of foreign varieties, and their hybridization with local cottons, and the induction of mutations by means of X irradiation or chemicals are among suggestions made to increase production.

458 SIMPSON, D. M. & DUNCAN, E. N.

Effect of selecting within selfed lines on the yield and other characters of cotton.

Agron. J. 1953 : 45 : 275-79.

Experiments have been carried out at the US Cotton Field Station, Knoxville, Tenn., to determine the effects of prolonged selfing and selection upon yield and other properties in four varieties. The tests were limited to the first, fourth, seventh and tenth generations. Only lint length exhibited marked improvement. An average loss of 15% in yield occurred, accompanied by minor decreases in lint percentage, lint index, strength and seed weight. Thus the selected strains were of less commercial value at the end of the ten-year breeding period than at the beginning. It is suggested that present standards of varietal uniformity may prevent the maximum use of hybrid vigour.

459 KULEBJAEV, V. G.

(The effect of external conditions upon the formation of heritable characters in cotton hybrids).

Uspehi Sovremennoi Biologii (Advances in Modern Biology) 1953 : 35 : 83-102. [Russian].

At the Turkmenian Research Station of the

USSR Cotton Institute, many new forms of cotton, interesting for their earliness, productiveness and high ginning percentage were obtained in experiments involving many direct and reciprocal crosses between Soviet fine-staple varieties (*Gossypium barbadense*). Analyses of the F_1 and later generations showed that the maternal parent was dominant in respect of the most important economic characters. The F_2 hybrids formed their sympodia lower on the plant, were earlier and more productive, and bore larger bolls, when trained upon lucerne sward. They had also higher ginning percentages than the material grown in a field where lucerne had not been grown for 5 years.

460 GREEN, J. M. & JONES, M. D.

Isolation of cotton for seed increase.

Agron. J. 1953 : 45 : 366-68.

Border rows of cotton were found to be the most effective method of reducing natural crossing of different strains of cotton caused by insect pollen carriers.

461 HUTCHINSON, J. B. & LAWES, D. A.

A note on the estimation of natural crossing in cotton.

Emp. Cott. Gr. Rev. 1953 : 30 : 192-93.

The degree of natural crossing in Upland varieties of *Gossypium hirsutum* was investigated at Namulonge, Uganda, by planting mutant Durango Cluster individuals as seed parents in a field of BP 52. The mutant differs from BP 52 in respect of the clustered fruiting branch and glabrous stems and leaves, so that hybrids occurring in progenies grown from single bolls were readily distinguishable. Distribution of outcrossing was highly heterogeneous, both among plants and among bolls on the same plant. No cross pollination took place in 50% of the bolls, but in 25% an odd seed per boll proved to be cross bred, and in the remaining 25% about half the seeds resulted from outcrossing. It is thus obvious that single plant selection is subject to a high degree of uncertainty in naturally pollinated stands; the problem of the isolation of breeding stocks also requires consideration.

462 NANJUNDAYYA, C.

Technological reports on trade varieties of Indian cottons, 1952.

Technol. Bull. Indian Cott. Comm. 1952 : Ser. A : No. 81 : Pp. 94.

The results of fibre, yarn and spinning tests on samples of 34 standard cotton varieties during the 1951-52 season are presented (cf. *PBA*, Vol. XXIII, Abst. 2072).

- 463 ABDUL HAMEED KHAN & MOHAMMAD AFZAL

Breeding of long-staple varieties of cotton in the Punjab.

Agric. Pakist. 1951 : 2 : 55-59.

A considerable number of long-linted varieties, collectively termed Lasani [Unrivalled], have been developed and are undergoing large-scale field trials. Yield and ginning outturn are high and fibre quality is good. It is hoped that long staple cottons will soon be available in quantity in the Punjab.

- 464 SAHASRABUDHE, V. B.

A statistical study of the factors affecting the efficiency of incomplete block designs.

Indian Cott. Gr. Rev. 1953 : 7 : 129-42.

In experiments at the Institute of Plant Industry, Indore, plot size was found to be the chief factor influencing the accuracy of incomplete block designs for variety trials. Under the moderate conditions of soil heterogeneity at the institute, and with plots of 50 sq. ft. or more, the incomplete block designs could be expected to show a 10-50% higher efficiency than the randomized block. The balanced lattice design is recommended for trials involving no more than 36 varieties. For testing a larger number, the double lattice design is regarded as the most convenient.

- 465 BALASUBRAMANYAN, R., KANNIAN, K. & RAMACHANDRAN, C. K.

The efficiency of lattice square design in cotton.

Indian Cott. Gr. Rev. 1953 : 7 : 143-48.

In experiments carried out by the Department of Agriculture, Madras, the lattice square showed little superiority over the randomized block design as a means of testing selected progenies.

- 466 BAXA, F.

Naša prvá bavlna. (Our first cotton plants).

Za Social. Zeměd. 1953 : 3 : 774-83.

Breeding work with cotton, which includes some promising material introduced from the USA, Bulgaria, Hungary and the USSR, has begun in Czechoslovakia.

- 467 WARD, J. M., HESSLER, L. E. & PAULSON, W. E.

Fiber characteristics and spinning performance of mechanically-stripped cotton on the High Plains.

Bull. Tex. Agric. Exp. Sta. 1953 : No. 757 : Pp. 20.

Data on wastage, spinning quality and fibre properties show that "stormproof" varieties,

characterized by lint retention, are better adapted to mechanical stripping in Texas than varieties with open bolls.

- 468 O'KELLY, J. F. *ET AL.*

Results of experiment station cotton variety test, 1952.

Miss Fm Res. 1953 : 16 : No. 1 : p. 2.

The results are given of cotton variety trials held in 1952. The new varieties Plains and Hybrid 56 produced well and proved resistant to *Fusarium* wilt. Also resistant to *Fusarium* were Coker, Wilt and Empire. Fox was outstanding as an early variety.

- 469 TURNER, J. H. (JUN.)

Differential response of cotton varieties to natural crossing.

Agron. J. 1953 : 45 : 246-48.

Lines obtained at Tifton, Ga., by exposing Coker 100 and Empire to natural crossing with 11 varieties at random for three years gave significantly greater yields of seed cotton than the parent stocks. Pandora, however, showed yield reductions after natural crossing. This differential response is discussed with relation to the influence of the unidentified male parent of open-pollinated seed, and to the possibility that the genetic balance of Pandora, a synthetic variety obtained by pooling 15 strains, is such that further outcrossing is detrimental.

- 470 CADOU, J. & KAMMACHER, P.

Essai d'interprétation des résultats d'un essai comparatif de variétés de coton par l'influence combinée de deux parasites: *Lygus vosseleri*, Popp. (Heter. Caps.) et *Empoasca* sp. (Hom. Jass.). [An attempt to interpret the results of a comparative variety trial of cotton by the combined influence of two parasites *L. vosseleri*, Popp. (Heter. Caps.) and *E. sp.* (Hom. Jass.). Cot. et Fibr. Trop. 1952 : 7 : 273-85.

An account is given of susceptibility to attack by jassids and *Lygus* of different varieties of cotton cultivated in Oubangui-Chari. Genetic factors influencing resistance appear to be different for each of the two parasites, but it is hoped to breed varieties resistant to both.

- 471 **The Empire Cotton Growing Corporation in Africa. II. Uganda.**

Emp. Cott. Gr. Rev. 1953 : 30 : 163-69.

The establishment and work of the Cotton Research Station, Namulonge, are briefly outlined. Particular reference is made to the development and use of Albar 51 as a source of

immunity from bacterial blight (cf. *PBA*, Vol. XXII, Abst. 2836 and Vol. XXIII, Abst. 2817).

472 MOOSBERG, C. A.

Breeding cottons resistant to bacterial blight disease.

Bull. Ark. Agric. Exp. Sta. 1953 : No. 534 : Pp. 21.

Three selections, resistant to *Xanthomonas malvacearum*, were made from the cotton variety Stoneville 2B, and designated BBR-1, BBR-3 and BBR-4. Their yield and quality were good, and they will be employed for breeding purposes with the object of reducing the time required to develop new resistant strains.

The resistance factor was found to be a simple recessive, and was successfully transferred to susceptible strains and varieties.

473 **The Empire Cotton Growing Corporation in Africa. III. Tanganyika Territory.**

Emp. Cott. Gr. Rev. 1953 : 30 : 170-76.

Research carried out at Ukiriguru, Lake Province, is reviewed by J. E. Peat, who refers to the breeding of jassid resistant strains such as Uk. 46 and Uk. 48, and the inclusion of Albar 51 in the programme of hybridization for resistance to bacterial blight (cf. *PBA*, Vol. XXIII, Abst. 2817). The design of field plots for variety trials at Ukiriguru, and the analysis of statistical material, are discussed by J. M. Munro. Investigations at Ilonga, Eastern Province, from 1943 to 1952, are summarized by A. G. Bebbington, the outstanding development being the selection of 47/10 from local seed. It outyields present commercial cottons and has better quality lint.

474 HUGHES, L. C. & FOWLER, H. D.

Resistance to a plant disease associated with high glucose content of the leaf.

Nature, Lond. 1953 : 172 : p. 316.

Synthesized cotton varieties whose blackarm resistance depends upon B_2 or $B_2 + B_3$ have been found to contain significantly greater amounts of glucose and raffinose in the leaves, compared with the corresponding susceptible parental types. The higher sugar content is present from the cotyledonary stage onwards. After three months from sowing, the glucose content in leaves of susceptible plants increases from a very low level at the beginning of the season to one almost as high as that in resistant individuals. The phosphate content in the leaves of a resistant cotton is also generally, but not invariably, higher than that in the leaf

extract of the susceptible type. Data from experiments on culturing blackarm bacteria under different conditions indicate, however, that resistance does not depend on the glucose itself but on some factor causing the high content in the early stage of growth.

475 NEAL, D. C.

***Fusarium* wilt resistance and fiber properties of some new cotton hybrids and selections.**

Phytopathology 1953:43:p. 292. (Abst.).

Among the hybrids and selections recently tested, the following showed the most promise with respect to *Fusarium* wilt resistance and fibre properties: Louisiana 33, Louisiana 3314, Deltapine 6-8-5 x Delfos 6102, back cross of the latter to Deltapine 6-8-5, Coker 100-97-2-2, Delfos 425-920, Deltapine 6-8-5 and Stoneville 2-B-R. Louisiana 33 is now in commercial production in north-west Louisiana and has given good yields in areas infected with both wilt and nematode.

476 SIKKA, S. M. & ARTA SINGH

Inheritance of jassid resistance in some Upland American cottons.

Indian Cott. Gr. Rev. 1953 : 7 : 113-17.

Inheritance of jassid resistance in *Gossypium hirsutum* was studied in crosses of acclimatized Punjab American cottons with Upland varieties from the United States. Resistance to injury by this pest was determined by two pairs of factors, *Aa* and *Bb*, resistance being dominant to susceptibility. The following genotypes are proposed for the different varieties: Tidewater and Webber, *aabb*; 124 F, *AAbb*; Missdel and Wild's strain, *aaBB*; and 199 F and 238 F, *AABB*.

477 **Annual Report of the Empire Cotton Growing Corporation for the year ending 31st March, 1953 : Pp. 24.**

Data concerning spinning tests undertaken at the Shirley Institute, United Kingdom, and yields from cotton grown in different territories are included (cf. *PBA*, Vol. XXIII, Abst. 2817).

478 BRYAN, W. E.

Pima S-1 cotton.

Progr. Agric. Ariz. 1953 : 5 : No. 2 : 6, 10.

Tests of the new cotton variety Pima S-1 show it to be superior in yield per acre and lint percentage to Pima 32. Although its fibre is weaker than that of Pima 32, it possesses more uniform lint. It shows considerable adaptability and the small size of the plants makes it suitable for mechanical harvesting.

479 PRESSLEY, E. H.

Cotton variety tests continue.

Progr. Agric. Ariz. 1953 : 5 : No. 2 : p. 12.

In tests at Mesa, Yuma and Sacaton, the new cotton varieties 4-42 WR, selected from 4-42, and 29-76-16 produced high yields and showed considerable resistance to *Verticillium* wilt.

480 BOERGER, A.

Der Lein als Oel- und Faserpflanze des La Plata-Gebietes. (**Flax as an oil and fibre plant in the La Plata district**).

Mater. Veg. 1952 : 1 : 17-42.

The importance and extent of flax and linseed cultivation in the La Plata area of Uruguay and Argentina are outlined, and a full historical account is given of breeding experiments designed to produce varieties suited to local conditions and resistant to *Melampsora lini*.

481 RÜDIGER, W.

Vergleichend-anatomische Untersuchungen an diploiden und tetraploiden Sippen kleinzelliger und grosszelliger Leinsorten. (**Comparative anatomical investigations into related diploid and tetraploid forms of small and large-celled flax varieties**).

Züchter 1953 : 23 : 243-48.

Diploid and tetraploid forms of the same flax varieties were compared. The $4n$ forms possessed fewer fibre cells, the diameter of these cells being however greater, especially at the base of the stem, this tendency being progressively diminished in the higher regions of the plant. The number of fibre bundles was slightly greater in the polyploid forms, the number of cells per fibre bundle being however smaller. The poor fibre yield of $4n$ flax is considered to be the result of an excess of chromatin. The length/breadth index of tetraploid flax cells is lower than that of $2n$ plants, hence a reduction in the length/breadth index of organs formed from these cells.

482 POTOČANAC, J.

Naše sorte ozimog lana i njihovo oplemenjivanje. (**Our varieties of winter flax and their value as breeding material**).

Arh. Poljopr. Nauk. 1953 : 5 : No. 7 : 118-136.

Many Yugoslav land varieties were investigated at Zagreb and are regarded as promising breeding material. Many selected strains proved tall and productive, but not winter hardy under the conditions of Yugoslavia. The length of

stems of some strains was improved by single plant selection.

483 SIEBEN, J. W.

The correlation between resistance to lodging and fibre content in flax.

Euphytica, Wageningen 1953 : 2 : 101-06.

Data and formulae are presented showing the extent to which the fibre content diminishes as resistance to lodging is increased. To breed a variety combining high fibre content with good degree of resistance to lodging, an examination of the fibre content at an early stage in the work of breeding for stiffness of straw is necessary.

484 DORST, J. C.

Does the present trend to select for resistance to lodging in flax involve dangers of a loss in quality?

Euphytica, Wageningen 1953 : 2 : 96-100.

There is a tendency for fibre content and quality to be reduced as resistance to lodging increases. In breeding, the two characteristics resistance to lodging and fibre content should be viewed independently and attempts made to discover genotypes which are exceptions and combine both qualities.

485 RATAJ, K.

Septoria linicola (Speg.) Gar. v Československu. [*S. linicola* (Speg.) Gar. in Czechoslovakia].

Sborn. Čsl. Acad. Žeměd. 1953 : 26 : 229-44.

Of several flaxes tested in Czechoslovakia, only Šumperský Textilák and Liral Monarch showed a high degree of resistance to *S. linicola*. A few strains from a Czechoslovakian world collection, one from Kirgizia, one from China and one from Rosenheim (Bavaria), produced some immune individuals.

486 BREDEMANN, G.

Verdreifachung des Fasergehalts bei Hanf (*Cannabis sativa* L.) durch fortgesetzte Männchen- und Weibchen-Auslese. [**Trebling the fibre content of hemp (*C. sativa* L.) by continuous selection of male and female plants**].

Mater. Veg. 1953 : 1 : 167-82.

Selective breeding over a period of 17 years has resulted in an increase in the average fibre content of *C. sativa* from 11% to 25.1% in female plants and from 10.2% to 24.6% in male plants. Élite plants showed a corresponding increase of from 13.1% to 31.8% in female and 12.9% to 29.6% in male plants. The fibre

produced was coarser and more brittle than in ordinary hemp plants. High fibre content proved dominant.

The increase in the fibre content was accompanied by a change in the anatomical construction of the plant, the proportion of wood in the stem decreasing as the cortical tissues thickened. This is not thought to affect lodging.

- 487 MOUTSCHEN, J. & GOVAERTS, J.
Action of gamma-rays on seeds of *Cannabis sativa* L.
 Nature, Lond. 1953 : 172 : 350-51.

In experiments at the University of Liège, Belgium, cytological abnormalities shown by heterochromosome X in plants raised from γ -irradiated seeds consisted of bridges, breakages and translocations. This chromosome underwent breakage more frequently than any other, the breakages usually being located in the heterochromatin. Breakages affecting heterochromosome X were more frequent in the neighbourhood of the centromere than in the heterochromatic zone of the longer arm, and were more frequent in the heterochromatic zone of the shorter arm than in the centromeric region. This differential sensitivity may provide a means of controlling sexual characters in *Cannabis*.

- 488 CAPOT, J., DE MEULEMEESTER, D., BRYNAERT, J. & RAES, G.
 Recherches sur une plante à fibres: l'*Abroma augusta* L. f. (**Research on a fibre plant, *A. augusta* L. f.**)
 Publ. Inst. Nat. Agron. Congo Belge, 1953 : No. 42 : Pp. 113.

Four chapters of this monograph are devoted to the results of botanical, ecological and technological studies of the plant and its fibre, while a fifth chapter deals with cultivation.

The botanical section includes information on (1) the taxonomy and geographical distribution of *Abroma*; (2) the histology and anatomy of *A. augusta*; and (3) a cytological study of the nucleus in *A. augusta*, for which the chromosome number $2n = 20$ has now been established.

- 489 LEFORT, M.
 Étude cytologique de deux variétés d'*Urena lobata*. (**Cytological study of two varieties of *U. lobata***).
 Cot. et Fibr. Trop. 1952 : 7 : 263-72.

U. lobata var. *communis* and *U. lobata* variety Nigeria were compared. In both cases $2n = 56$. The Nigerian variety proved superior in all botanical and agricultural respects.

- 490 RICAHUERTA, J. R.
Germination and variability study of seven abacá varieties.
 Philipp. Agric. 1952 : 35 : 504-14.

Of the seven varieties of abacá which were tested, Bulao, Puti, Binukid and Itum gave the highest percentage of germination.

- 491 REGEL, C.
***Iris ensata*—A fibre plant.**
 Mater. Veg. 1953 : 1 : 310-11.

An account is given of *I. ensata*, a native of Siberia, the Far East and Central China. This wild plant gives a high yield of fibre, and the author suggests that by selective breeding a fibre plant could be developed for cultivation on sandy or saline soils where other fibre plants will not grow.

SUGAR AND STARCH PLANTS

- 492 RAO, B. V. & LAKSHMINARAYANA BHATTA, K.
Practical hints on sugarcane cultivation in Mysore.
 Mysore Agric. J. 1953 : 29 : 41-50.

Data on varieties suitable for cultivation in Mysore are given, together with a list of improved varieties shortly to be released.

- 493 **Annual Report of the Experiment Station of the South African Sugar Association, Natal, 1952 : Pp. 41.**

This report of the Mount Edgecombe Experiment Station, Natal, recounts the history of the station since its establishment in 1925. General outlines of the objectives of each of the research departments include details of breeding techniques, varietal selection and trials of yielding ability and disease reaction. An appendix lists the canes maintained at Mount Edgecombe and in the quarantine glasshouse at Durban.

- 494 SORNAY, A. DE
 La canne à sucre M 134/32. (**The sugar cane M 134/32**).
 Rev. Agric. Maurice 1953 : 31 : 5-11.

The breeding of this new high yielding cane in Mauritius from the interspecific cross of the Java cane POJ 2878 with D 109, a noble cane derived from White Transparent from Demerara, is described. The popularity of M 134/32 in Mauritius is attributed to the following characteristics among others: high sugar content; resistance to wind, drought and diseases; tolerance of *Phytophthora*; and good germination of cuttings and the rapidity with which the young shoots cover the ground.

Canes that have surpassed M 134/32 under certain conditions are Ebène 1/17 [Ebony 1/17] and M 122/34.

- 495 LI, H. W. & SHANG, K. C.
Genetical studies of the interspecific cross, cane varieties and *Saccharum robustum*.
 Rep. Taiwan Sug. Exp. Sta. 1951 : No. 7 : 25-45.

Genetical analyses of stem characters and sugar content were carried out at the Taiwan Sugar Experiment Station using progenies of [Sampang A (*S. officinarum*) x NG 251 (*S. robustum*)] x POJ 2725 and [F 85 (*S. officinarum*) x 28 NG 251] x POJ 2725. The polyploid nature of both species was evident from the multiple factors determining all characters investigated. There is some indication that the high fibre content of *S. robustum*, which enables canes to survive typhoons without lodging, can be combined with the juice quality of *S. officinarum* after very few back crosses.

- 496 **Twenty-second annual report of the sugarcane research station.**

Rev. Agric. Maurice 1953 : 32 : 130-40.

Details are given of a wide range of hybrid crosses made with the object of breeding early maturing varieties, and also rich and high-yielding canes for areas with poor soil.

Data are also presented on variety trials. Of four Barbados varieties tested, B 37161 and B 37172 were promising. M 11/43 and M 31/45 were superior among new varieties raised locally. In third year trials, M 31/45, a selection from the cross M 134/32 x M 99/34, was distinguished by a high yield, good quality juice and ability to crop well in areas with a high rainfall.

- 497 LI, H. W. & MA, T. H.
List of the chromosomal numbers of sugarcane varieties and sugarcane relative plants.
 Rep. Taiwan Sug. Exp. Sta. 1951 : No. 4 : 47-54.

Chromosome counts, based on configurations at first anaphase, are reported for 175 specimens flowering at the Taiwan Sugar Experiment Station. Many unnamed seedlings and interspecific hybrids are included, with a few intergeneric hybrids from crosses involving *Miscanthus*, *Erianthus* and *Sorghum*.

- 498 LI, H. W., MA, T. H. & SHANG, K. C.
Cytological studies of sugarcane and its relatives. IX. Further studies of hybrids of intergeneric and interspecific crosses.
 Rep. Taiwan Sug. Exp. Sta. 1951 : No. 7 : 1-24.

Details are given of chromosome pairing at the

first meiotic division in the following hybrids obtained in Taiwan from POJ 2725 ($2n = 107$) x *Miscanthus japonicus* ($2n = 38$): (1) a nobilized hybrid with 126 chromosomes, derived from an unreduced ♀ gamete and a reduced ♂ gamete; (2) an intermediate hybrid with 72-74 chromosomes contributed by the reduced gametes of both parents; and (3) a hybrid with $2n = 96$, resulting from the combination of a reduced ♀ gamete and an unreduced gamete of *M. japonicus*. Partial homology is suggested between some of the chromosomes from *Saccharum officinarum*, *S. spontaneum* and *Miscanthus*.

A cross between 34-1085 (POJ 2725 x F 23), having 114 somatic chromosomes, and the Glagah Tabongo variety ($2n = 80-84$) of *S. spontaneum* gave hybrids ($2n = 99$) arising from reduced gametes from both parents; a single plant with 193 chromosomes was also produced. The latter may have arisen by an irregularity in the first embryonic division of the normal hybrid. Ultimate limitations on the number of chromosomes possible in the genus *Saccharum* are discussed with respect to the nucleocytoplasmic ratio; it is noted that the plant with $2n = 193$ is much less vigorous than hybrids with $2n = 99$.

It has been suggested that the form of *S. spontaneum* with $2n = 88$ (cf. PBA, Vol. XX, Abst. 409) is a natural hybrid between *S. spontaneum* var. *roxburghii* ($2n = 96$) and the variety of *S. officinarum* named Rose Bamboo ($2n = 80$).

- 499 TIO, M. A.
Photoperiodic responses of sugar cane in Puerto Rico.
 Abstr. Doct. Diss. Pa St. Coll. 1952 (1953) : 15 : 110-12.

At Rio Piedras, Puerto Rico, flowering was inhibited in a large number of plants of the variety POJ 2878 by supplementary illumination (6 to 12 p.m.) for 1½ months from September to November. Complete suppression of inflorescence production in M-28, accompanied by reduced tillering, was achieved by supplementary lighting of the same intensity from 11 p.m. to 1 a.m. for 4 months, from August to December. Initiation of floral primordia on M-28 was also suppressed when the supplementary illumination was given earlier in the season, from May to September, even though plants were returned to short-day conditions afterwards. Increased sugar yields were induced only by the last treatment.

500 SHANG, K.-C.

(Studies on sugar cane pollen).

Rep. Taiwan Sug. Exp. Sta. 1951 :
No. 4 : 55-74. [Chinese].

Aborted pollen is largely brought about by environmental conditions. In the pollen-sterile varieties F 82, FP 165, 174, 177 and 187, 27A-1570, 29A-967 and 36-745, however, sterility is associated with laggard chromosomes, which later form micronuclei.

501 LUGO-LÓPEZ, M. A., SAMUELS, G. & MÉNDEZ, F.

Factors affecting the sucrose content of sugarcane: III. Varieties.

J. Agric. Univ. P.R. 1953 : 37 : 28-34.

Data are presented on the sucrose content of 20 locally grown sugar cane varieties at 41 centres in Puerto Rico. M 28, M 336, PR 902, PR 905 and PR 907 were superior to the standards, POJ 2878 and BH 10-12, in this respect.

502 FORS, A. L.

El banco internacional de variedades indígenas de caña y su importancia.

(The international bank of native cane varieties and its importance).

Bol. Asoc. Téc. Azuc. Cuba 1953 : 12 :
141-47; 203-04.

Reference is made to a proposal, emanating from the Rockefeller Foundation and discussed at the eighth International Congress of Sugar Cane Technologists, to establish the bank of sugar cane breeding material in question, and the claims of Cuba as a suitable site are advanced.

503 SAIYID MUHAMMAD IBRAHIM SHAH & MIAN OBAIDULLAH JAN

Another variety of sugarcane for N.W.F.P.

Agric. Pakist. 1952 : 3 : 274-76.

Data are presented on a new early-maturing variety of sugar cane, Co. 622, to be introduced into the North West Frontier Province to replace Co. 290. Co. 622 possesses good agronomic characteristics, yields over 600 mds. of high sucrose-content sugar per acre, is resistant to lodging, frost and drought and comparatively resistant to attack by insects. The seed germinates quickly, the plant tillering early and producing medium-thick canes that crush easily.

504 Characteristics of our principal sugar cane varieties.

Aust. Sug. J. 1953 : 45 : 223-24.

Data are given on a number of sugar-cane varieties, together with a section on sugar-cane diseases.

505 BOUCHÉREAU, P. E.

Virulence of a root pathogen as conditioned by nutrition.

Phytopathology 1953 : 43 : p. 289.

Pythium isolates from sugar-cane varieties showed an increased virulence upon maize roots, when cultured on media containing salicylic aldehyde. Chemical analysis of the expressed juice of resistant and susceptible sugar-cane varieties indicated that the degrees of injury produced by even the virulent strains may be limited by the nutritional compounds in the roots themselves.

506 CHEN, M.-T.

(Observations on leaf characters and resistance to *Ceratovacuna lanigera* in sugar cane).Rep. Taiwan Sug. Exp. Sta. 1951 : No. 4 :
75-81. [Chinese].

The relationship between resistance to *C. lanigera* and various anatomical characters of the leaf was studied in a series of new Taiwan seedlings. No correlation with resistance was detected in the case of stomatal density, the frequency of 1-cellular or 2-cellular hairs, or leaf size; it was noted, however, that thin blades with a large number of fine vascular bundles tended to suffer heavier infestation.

507 GONZÁLEZ RÍOS, P. & ADSUAR, J.

Effect of mosaic on the yield of sugarcane variety B. 34-104.

J. Agric. Univ. P.R. 1953 : 37 : 13-18.

Although B 34-104 is unaffected by mosaic in Jamaica, trials conducted at Río Piedras, Puerto Rico, have shown that yields of cane and sugar are reduced by infection with the local strain of the virus. Growers' claims that B 34-104 can recover from mosaic were not confirmed during a period of three years.

508 ORIAN, G.

La maladie des stries chlorotiques de la canne à sucre. (Chlorotic streak disease of sugar cane).

Rev. Agric. Maurice 1953 : 32 : 115-20.

The comparative susceptibility of some sugar cane varieties grown in Mauritius is discussed. M 134/32 (cf. Abst. 494) is susceptible; B 37161, a commercial variety from Barbados, seems resistant.

509 Sugar cane experiments in Trinidad, 1952. II. Varietal experiments.

J. Agric. Soc. Trinidad & Tobago 1953 :
53 : Pt. 2 : p. 187.

In sugar-cane variety trials, B 43391 and B 41227 gave high yields, and in first and second ratoon

cane experiments B 37161, B 34104, B 3337 and B 41211 did well in comparison with standard varieties.

- 510 HEBERT, L. P. & MATHERNE, R. J.
Results of sugarcane variety tests in Louisiana during 1952.
 Sug. Bull., N. Orleans 1953 : 31 : 354-60, 377-78.

Tables are given for comparative varietal yields of cane and sugar per acre and yields of sugar per ton of cane for large scale variety tests on light, heavy and muck soils.

In all trials the variety CP 44/101 proved superior in yield to all other commercial varieties. Attempts are being made to incorporate in it resistance to the stunting disease from which it suffers.

CP 43/47 proved highly satisfactory on light soils, CP 36/13 on muck soils, and CP 44/154 and CP 44/155 on both types of soil.

The as yet unreleased varieties N Co. 310, CP 48/103 and CP 45/184 did well in the tests; the last-named variety has however a low percentage of sugar extraction.

- 511 GOUAUX, C. B.
Sugar cane test fields in 1952.
 Sug. Bull., N. Orleans 1953 : 31 : 361-68.

The results are given of variety tests of sugar cane at eight centres, on different types of soil. CP 44/101 did well under all conditions, followed by CP 44/154 on sandy or silt loam soil and by CP 45/184 on fine sandy soil.

Four promising new varieties are described. CP 45/184 and CP 47/193 are vigorous small-diameter canes, and give good yields on both heavy and light soils. CP 48/103 and Co 310 yield well, have a high sucrose content and are best suited to light soils.

- 512 GOUAUX, C. B.
Three and four year test field averages of some important sugar cane varieties.

Sug. Bull., N. Orleans 1953 : 31 : 395-98.

Comparative data are presented on sugar cane variety trials held at eight centres. CP 44-101 proved superior to other varieties tested, except on the alluvial soils of the Mississippi and Red river areas. The varieties CP 36-105 and CP 44-155 also gave yields considerably above the average.

- 513 OBAIDULLAH JAN & RAZA HUSSAIN
Sugarcane varieties in the N.-W.F.P.
 Agric. Pakist. 1952 : 3 : 18-21.

The results are given of three years' trials at Tarnab Farm, designed to select early-maturing

and frost-resistant varieties of sugar cane suitable for the varying climatic extremes of the North West Frontier Province.

Among the medium-early varieties, a new selection, Co. 622, gave the highest yield of crystallized cane sugar per acre. Of the midseason varieties, Co. 527 and Co. 451 proved superior.

- 514 MATSUMURA, S. & MOCHIZUKI, A.
Improvement of sugar beet by means of induced triploidy.
 Idengaku Zasshi/Jap. J. Genet. 1953 : 28 : 47-56.

In tests in various districts of Hokkaido, triploids have consistently shown superiority in vigour, root yield, sugar content and purity, and resistance to diseases and insects, compared with the chief commercial diploid variety Honiku 192. The triploids are inferior in germination rate, but the $4n$ parents are variable in this respect. Several triploid hybrids have therefore been tested for germinability and other characters. The triploid Honiku $398(4n) \times$ Honiku $162(2n)$, with 10-15% increase in root yield and sugar content over Honiku 192, is considered to be the best, and its cultivation on about one-fourth of the Hokkaido area of sugar beet production is expected in a few years. Seed from open-pollinated $4n$ mother plants gives a higher proportion of $3n$ progeny than that from $2n$ mother beets. For large-scale production of seed, use of $4n$ and $2n$ plants in a ratio of 3 : 1 is advocated, with maximum synchronization of blooming season. In this way, 75% $3n$ progeny can be secured. Diploid pollen grains have lower germinability and rate of growth than n grains; this behaviour may be partly responsible for the higher proportion of $2n$ seed produced by $2n$ beets in mixed sowings of diploids and tetraploids, and for the relatively few $4n$ plants from $4n$ mothers.

- 515 NEGOVSKIĬ, N. A. & TITOVA, N. F.
(Vegetative hybridization of the sugar beet).

Agrobiologija (Agrobiology) 1953 : No. 3 : 110-15. [Russian].

Experiments with various vegetative hybrids involving sugar beet as either stock or scion are reported from Kiev. Analyses of several F_0 hybrids of mangel on sugar beet showed that the stocks had a beneficial effect upon the sugar content but reduced the size of the roots. The F_0 of the reciprocal grafts, on the other hand, had a lower sugar content, but the root weights increased. The F_1 of some mangels on sugar beet produced similar root yields to those

of the scion varieties and higher sugar yields per plant and per hectare. The F_1 of several sugar beets grafted on mangels showed increases in root weights and total sugar yields, although the sugar content of individual roots was lower than that of the initial scion varieties. Most sexual hybrids, derived from the same components as their grafted counterparts, differed but little in respect of their yield characters from the F_1 of the vegetative hybrids. However, a sexual hybrid which had a much lower sugar content than the corresponding F_0 vegetative hybrid, two sexual hybrids which yielded less, and one which yielded more sugar per ha. than their respective counterparts are mentioned. Some stocks, which transmitted high sugar content to their F_0 , did not give a first seed generation superior in this respect to that of other stocks with less noticeable effects upon sugar content in the F_0 . Reference is made to the effects of selfing upon some grafted material. For instance, a mangel grafted on sugar beet gave, when selfed, roots weighing 18 g. more, and produced 6.4 g. more sugar than the initial scion variety. Experiments with beetroot grafted on sugar beet, and Swiss chard on sugar beet, are referred to briefly.

- 516 MARGARA, J., CAGNIART, J. & TOUVIN, H. Essais effectués en 1952 sur le comportement des variétés de betterave sucrière à l'égard du *Cercospora*. (**Experiments carried out in 1952 on the behaviour of sugar beet varieties with regard to *Cercospora***). Ann. Inst. Nat. Agron., Paris 1953 : 3 : 43-55.

Further preliminary stages in the search for suitable material for the proposed breeding programme at the Central Station of Genetics, Versailles (cf. *PBA*, Vol. XXIII, Abst. 2108) are recorded. The yields obtained from certain resistant varieties of types ranging from E to Z, in the absence of *Cercospora*, suggest that an intermediate type of sugar beet, at least semi-resistant as well as productive, could be bred.

- 517 COONS, G. H. **Disease resistance breeding of sugar beets—1918-1952.** Phytopathology 1953 : 43 : 297-303.

Sugar beet breeding in the United States during this period is reviewed, with reference to the tendency in recent years to develop strains with a high degree of resistance to either leaf spot (*Cercospora beticola*) or curly top, the possession of additional factors for resistance to

other diseases being of secondary importance. The factor for male sterility is being widely used to produce disease resistant hybrids with improved physiological and morphological characters.

- 518 COONS, G. H. **Resistance of sugar beets to virus yellows.**

Phytopathology 1953:43:p.405. (Abst.). In field plots accidentally exposed to severe infection at Salem, Ore., various commercial varieties, US 15, US 225, US 1177 and the monogerm inbred SL 101 proved susceptible. A high degree of resistance was, however, shown by US 201-B, an inbred resistant to leaf spot, and four inbreds with resistance to curly top, namely, NB 6-56, SL 0502, SL 0504 and SL 8255. These four inbreds also proved resistant to yellows in subsequent tests at Salinas, Calif., and may afford a new approach to breeding for yellows resistance.

- 519 THOMPSON, E. G. **Sugar beet strains. Official trials reviewed.**

Brit. Sug. Beet. Rev. 1953 : 22 : 21-23. In the 1952 trials conducted by the National Institute of Agricultural Botany, Cambridge, the highest calculated yield of sugar was again given by the German Klein E, followed by Sharpe's Klein E and the new Johnson's E. Over a three year period, on normal soils under conditions where bolting was not serious, the highest yields of sugar were given by Klein E (German), Hilleshög, Sharpe's Klein E, Canell's (No. 22) and Goldsmith's Dobrovice.

- 520 KRÜGER, W. Sind Poly-Rüben überlegen? (**Are polyploid beets superior?**) Mitt. dtsch. Landw.Ges. 1953 : 68 : 929-31.

Commercial field trials conducted by the sugar factory at Elsdorf showed the superiority in yield and quality of juice of polyploid sugar beet over the E strain.

- 521 WAUTHY, R. & ROUSSEL, N. Les résultats des essais de variétés de betterave sucrière en Belgique de 1947 à 1952. (**The results of variety trials of sugar beet in Belgium from 1947 to 1952**). Publ. Tech. Inst. Belge Amélior. Better. 1952 : 20 : 175-88.

Extensive tabular data are given on the root yield, sugar content and yield, foliage production

and incidence of bolting of varieties under trial at a chain of testing stations in Belgium.

STIMULANTS

- 522 STANKOVIĆ, I.
Korišćenje heterozisa za povećanje prinosa i poboljšanje kvaliteta naših duvana. (**Heterosis as a method of increasing the yield and improving the quality of our tobaccos**).
Arh. Poljopr. Nauk. 1953 : 5 : No. 7 : 153-169.

The heterotic effects in many tobacco hybrids, obtained at the Prilep Tobacco Institute, Yugoslavia, are described. The most appreciable yield increases were recorded for the wide crosses Jaka x Čajnz, Prilep x Čajnz and Prilep x Djumar. All hybrids proved intermediate in respect of leaf quality.

- 523 SCARASCIA, G. T. & VENEZIAN, M. E.
Mutabilità cromosomica spontanea e stato enzimatico in semi di *Nicotiana rustica* di diverse annate. (**Spontaneous chromosome mutation and the state of the enzymes in seeds of *N. rustica* from various harvests**).
Tabacco, Roma 1953 : 57 : 272-98.

The physiological interpretation of spontaneous mutation receives support from this study of germination capacity, chromosome aberrations and enzyme activity in seeds of the tobacco varieties Tombac and Kreuzuni, harvested between 1940 and 1951. The results showed that the number of irregular anaphases with chromosome aberrations, e.g. bridges and fragmentation, increased with the length of the storage period and was correlated with loss of germination capacity.

Catalase activity declined markedly after the first year of storage, and slowly in subsequent years, whereas, with one exception, carbonic anhydrase activity increased with the duration of storage. Polyphenol oxidase activity apparently ceases when the stage of physiological maturation is reached.

- 524 ENDEMANN, W.
Wird der Nikotingehalt der Samennachkommenschaften durch Pfropfungen beeinflusst? (**Is the nicotine content of progeny obtained from seed influenced by grafting?**)
Züchter 1953 : 23 : 206-07.

In grafting experiments with different varieties of tobacco, and of tobacco on tomato, it was found that the nicotine content of the scion

depended largely on the variety used as stock, since the root produced the greater proportion of nicotine.

Numerous tests, involving several methods, were carried out to determine whether the progeny of seeds produced was influenced by the choice of stock upon which the parent plant had been grafted. In no case did the grafting influence the nicotine content of the following generation.

- 525 SCARASCIA, G.-T.
Sviluppo del tappeto dell'antera in *Nicotiana Tabacum* L. var. Bright. (**Development of the anther tapetum in *N. Tabacum* L. var. Bright**).
Caryologia, Pisa 1953 : 5 : 25-42.

The various endomitotic divisions of the diploid nucleus of the tapetal cell, which are described, lead to the formation of cells with high degrees of polyploidy, up to $32n$ having been observed in some cells. Some 22% of the cells remained uninucleate.

- 526 LEFÈVRE, J.
Sur les tumeurs spontanées de certains hybrides interspécifiques de *Nicotiana*. (**On the spontaneous tumours of certain interspecific hybrids of *Nicotiana***).
CR Acad. Agric. Fr. 1953 : 39 : 409-12.

This is a short discourse on the thesis reviewed in *PBA*, Vol. XXIII, Abst. 1372.

- 527 SMITH, H. H.
Studies on gene systems that differentiate species.
Erfelijkh. i. Prakt. 1953 : 14 : 16-17.

Research on variation in the size of the corolla caused by combining different proportions of the genomes of the large-flowered *Nicotiana sanderae* and the small-flowered *N. langsdorffii* is reviewed (cf. *PBA*, Vol. XIII, Abst. 906). An analysis of colchicine-induced trisomics of *N. langsdorffii* has shown that each of the nine chromosomes of *N. langsdorffii* has a different effect on corolla size. A series of trisomics of *N. sanderae* is being examined so that differences between the effects of chromosomes of each species on the common genetic background of the F_1 hybrid can be determined.

Biometrical methods of partitioning phenotypic variances were also used to analyse genetic differences between these species.

True-breeding lines, morphologically distinct from either parent, have been selected from the F_2 . Partial sterility was observed in progenies

resulting from crosses between these selections and the original parents. The occurrence of individuals with corollas transgressing the parent species in respect of size is noted.

528 COTA GALÁN, R.

Estudios sobre selección de plantas de tabaco por su contenido en nicotina. II. Sobre la aplicación a la *Nicotiana rustica*, variedad "Erbasanta tetraploide", del método anteriormente desarrollado. (**Studies on selection of tobacco plants for nicotine content. II. The application to *N. rustica*, variety tetraploid Erbasanta, of the method previously developed**).

Bol. Inst. Invest. Agron., Madr. 1953 : 8 : 29-55.

An improved form of the method previously described (cf. *PBA*, Vol. XXII, Abst. 1321) is referred to, in which β -naphthylamine is used in place of α -naphthylamine and the colour is measured by an Etco photocolormeter or a Spekker absorptiometer. The experiments were carried out with a tetraploid form of Erbasanta.

529 CLAYTON, E. E.

Control of tobacco diseases through resistance.

Phytopathology 1953 : 43 : 239-44.

Breeding for disease resistance in tobaccos in the United States is surveyed. Resistance to the chief diseases has been found in *Nicotiana tabacum*, but so far it has been only possible to exploit less than half of this resistance in breeding, since with one exception inheritance of resistance is polygenic, and since disease resistance is usually associated with an inferior expression of economically important characters. Valuable commercial varieties have however been developed, possessing different degrees of resistance to black root rot, black shank, bacterial wilt and *Fusarium* wilt. Immunity or a very high level of resistance to diseases has been discovered in various other species of *Nicotiana*. Transfers of simple monogenic and dominant immunity from mosaic and wildfire have been achieved, without any apparent association of this immunity with any other characters. Similar transfers of immunity from root rot and resistance to blue mould are at an advanced stage.

530 NOORDHOFF, L. J.

Dixie Bright 28.

Sth. Seedsman 1953 : 16 : No. 9 : p. 18.

Dixie Bright 28 is a selection from a cross

between two Granville wilt-resistant tobacco lines, themselves deriving their wilt resistance from TI 448A. It combines high yield with a leaf of superior quality.

531 APPLE, J. L. & LUCAS, G. B.

Effectiveness of various field inoculation procedures in testing tobacco for black shank resistance.

Phytopathology 1953 : 43 : p. 289. (Abst.).

Root inoculation with pure cultures grown on sterilized oat grains, at the time of transplantation and under conditions of an average temperature of 68° F and ample moisture, was found to be the most effective technique for separating moderately resistant lines of tobacco.

532 PUZZILLI, M.

Osservazioni sugli ibridi di prima generazione ottenuti tra le linee americane resistenti al mosaico e la linea Italia di Virginia Bright. (**Observations on first-generation hybrids between American mosaic-resistant lines and the line Italia of Virginia Bright**).

Tabacco, Roma 1953 : 57 : 207-16.

A number of mosaic-resistant American lines of Virginia Bright were crossed with the line Italia, which possesses desirable leaf qualities. The F_1 hybrids displayed greater resemblance to the Italian than to the American parents but had a stronger root system and certain defects in quality, which made it necessary to cross them again with one of the best Italian lines. One of the F_1 lines gave a necrotic reaction similar to that of the American parents, possessing the gene *N*, and sap obtained from it showed no signs of containing the virus. Others gave necrotic reactions but accepted the virus to a certain extent, and still others behaved as healthy carriers.

533 ROSS, H.

Bekämpfung der Viruskrankheiten bei Kulturpflanzen, insbesondere durch Züchtung resistenter Sorten. (**Combating virus diseases in cultivated plants, with special reference to the breeding of resistant varieties**).

Arch. dtsh. LandwGes. 1951 : 8 : 80-86.

Crosses between *Nicotiana tabacum* and *N. glutinosa* have given 48-chromosome hybrids containing the *N. glutinosa* gene for mosaic resistance. Crossing-over is expected to result in varieties in which the only *glutinosa* material remaining is the segment containing the resistance gene.

- 534 AGAPOVA, I. V.
(The inheritance of immunity to tobacco mosaic virus in some grafted Solanaceae).

Trudy Inst. Genetiki (Proc. Inst. Genet.)
 1952 : No. 19 : 248-56. [Russian].

The seed progenies of *Nicotiana tabacum* grafted on *N. glutinosa* or on Ternovskii's hybrid (*N. glutinosa* x *N. tabacum*) showed the same response to tobacco mosaic virus as their stocks. The experimental results conflict with the Morganist theory that necrotic response is dependent on the presence of definite genes. No changes in the type of resistance to the virus were observed in the scion in the year when the grafts were made.

- 535 VAN DER KNAAP, W. P.
 Enige gegevens over de variabiliteit in productievermogen van theeclonen.
(Some data on variability in productive capacity of tea clones).

Arch. Theecult. 1953 : 18 : No. 2 : 1-31.

The roles played by heredity and environment as factors causing variation in yield are referred to in this analysis of production of tea clones and seedlings at the experimental plantation at Pasir Saronggé in West Java. The application of covariance analysis, with an adequate number of replications, is recommended to reduce variability in field experiments.

In general, the estimation of productivity calls for yield determinations for a long period.

- 536 PORTSMOUTH, G. B.
The principles of bush management.
 Tea Quart. 1953 : 24 : Pts. I & II : 17-20.

The results are given of trials of new tea clones. Clone 2024 gave the highest yield. Selection for resistance to eelworm continues and some success has been achieved.

- 537 PORTSMOUTH, G. B.
Report of the plant physiologist for the year 1951.

Bull. Tea Res. Inst. Ceylon 1951 (1953) : No. 33 : 33-37.

Yields and reaction to blister blight are given for clones in the 1947 series. Clone 2024 gave by far the highest yield, was highly resistant to blister blight, produced good quality tea and was easy to root.

- 538 VAN HEUSDEN, W. C.
 Aanbevolen theeplantmateriaal. **(Recommended planting material of tea).**

Bergcultures 1953 : 22 : p. 181.

Though not immune to blister blight, the following three productive clones are recommended as much less affected than others when

grown in conditions highly favourable to the disease: PS 1, KP 4 and GP 7. Their cuttings also take moderately well. Eight other clones receive favourable mention (cf. Abst. 539).

- 539 VAN DER KNAAP, W. P.
 Blisterblight resistentie van theeclonen.
(Blister-blight resistance of tea clones).

Bergcultures 1953 : 22 : 177-79.

Large-scale tests of clones at the Pasir Saronggé experimental plantation in West Java having revealed clonal differences in resistance to *Exobasidium vexans*, the author now proposes that a systematic search for resistant bushes or clones should be conducted by: (a) observation of the reaction of existing clones to the disease; (b) selection of new mother trees; and (c) selection of future breeding material for resistance in a nursery severely infected artificially with the disease.

Method (a) has already yielded some results (cf. Abst. 538) and the best technique for (c) is being examined.

- 540 **Annual Report of the West African Cacao Research Institute, Tafo, Gold Coast, April, 1950 to March, 1951 (1953) : Pp. 63; and April, 1951 to March, 1952 (1953) : Pp. 54.**

Selection E 1, the highest yielder in progeny trials, has produced very low yields in clonal tests. A study is therefore being made of the setting capacity and compatibility of the parental E 1 material, in view of the problem of establishing clonal blocks for seed production. Cuttings of selections have shown inherent differences in rooting potentiality.

Upper Amazon selections and Amelonado were found to be cross compatible. Three *Herrania* species showed complete self and cross compatibility. The cross *Herrania* x Amelonado was incompatible, whereas the reciprocal gave a high proportion of seed sets. Section E 1 was re-tested and found to be self incompatible. A chromosome number of $2n = 20$ is reported for *Theobroma cacao* (E 1 and Upper Amazon T60), *Th. bicolor*, *Th. obovatum*, *Th. microcarpum* and *Th. grandiflorum*.

Four more strains of swollen-shoot virus have been discovered. In pod-inoculation tests with virulent virus 1A, Upper Amazon types again showed greater resistance to bean infection than Amelonado, resistance being higher in Nanay x Nanay and Nanay x Parinari selections than in Parinari x Parinari. As in previous tests, compared with Amelonado, Nanay x

Parinari progenies exhibited greater resistance to infection with virus 1A by vectors feeding on the cotyledons.

Analysis of Amelonado, Parinari x Nanay (Upper Amazon) and TF 2 clonal material has indicated the following: a significantly higher butter-fat content in the Upper Amazon selection; uniformity of the TF 2 material with respect to butter-fat content; an almost identical total alkaloid and theobromine content in all three types; highly significant differences in alkaloid content between trees within the types; and a significantly higher caffeine content in Amelonado.

A method of evaluating the taste of samples from small-scale fermentations by means of the incomplete block design is described.

Using 20-40 lb. samples of wet cocoa, factors affecting fermentation have been investigated, including varietal differences. It has been concluded that Upper Amazon types are much more difficult to ferment than Amelonado.

541 Annual Report of the West African Cacao Research Institute, Tafo, Gold Coast, April, 1952 to March, 1953 (1953) : Pp. 39.

The results of progeny, variety and clonal trials are given. The selection E1 maintains its superiority in yield, but compatibility tests have shown it to be self sterile. *Theobroma grandiflorum*, *Th. speciosum* and *Th. bicolor* were used for virus and chemical tests, and an extensive programme of hybridization with *Th. cacao* was carried out. The fact that few hybrids survived was attributed to their genetic disequilibrium. Cytological investigations, concerned mainly with the elucidation of the breeding system in local and foreign types of cacao, were made. A new series of one-acre variety trials is planned, and it is hoped to compare the performance of local and foreign selections in relation to soil and climatic conditions. Hybrids derived from crosses between local trees and Upper Amazon varieties have proved extremely vigorous (cf. *PBA*, Vol. XXII, Abst. 2914).

Further details are given of virus strain research in West Africa (cf. *PBA*, Vol. XXII, Abst. 1342). A new series of cross-protection tests has been initiated, the virus strains being classified according to geographical area of origin.

542 A report on cacao research 1945-1951.

Imp. Coll. Trop. Agric., Trin. 1953 : Pp. 131.

A progress report is presented of research into

all aspects of cacao production. Practical aspects of the propagation of cacao by cuttings are given. An expedition has been sent to the Orinoco and Amazon area to find wild types combining quality of cocoa with resistance to pests and diseases, and these will be used for breeding experiments. Particulars are given of varieties of cacao introduced from other countries.

Breeding and genetical studies were made of *Theobroma cacao* and crosses were effected to determine the possible genetic relationships within the genus.

Cacao clonal trials were held. At River Estate the clone ICS 1 gave the best average yield; the ICS clones 6, 8, 39, 40, 43, 49, 60, 84, 95, 98 and the SCA clones 6 and 12 were also satisfactory. At San Juan the ICS clones 95, 89, 40 and 84 gave the highest yields.

543 KNIGHT, R. & ROGERS, H. H.

Sterility in *Theobroma cacao* L.

Nature, Lond. 1953 : 172 : p. 164.

At the West African Cacao Research Institute, Tafo, Gold Coast, a study has been made of sterility in types originally collected by Pound in the upper reaches of the Amazon, and later studied by Posnette (cf. *PBA*, Vol. XVI, Abst. 574), who obtained pods from trees of this collection in Trinidad. These Amazonian types are all self sterile, but cross fertile to a limited extent. The results of cross pollinations of progenies of crosses made by Posnette indicate that five alleles at a single locus, *W1*, *W2*, *W3*, *W4* and *W5*, are involved. The alleles exhibit dominance in the sequence indicated by their numbers, *W1* being the most dominant. The diploid constitution of both the male and female parents determines the failure or success of a cross. Failure probably occurs after fertilization of the ovules. This sterility system is compared with the systems of *Crepis foetida* and *Parthenium argentatum*.

544 VALLECILLA, C. A.

La germinación del polen de cacao y el crecimiento del tubo polínico en relación con los fertilizantes, sustancias activas y sustancias menores. (**Germination of cacao pollen and growth of the pollen tube in relation to fertilizers, active substances and minor elements**).

Acta Agron., Palmira 1953 : 3 : 189-208.

Treatment of the flowers with p-chlorophenoxy-acetic acid increased the fruit set in self pollinations made on self-compatible trees at a time of the year when little or no set occurs normally.

A favourable influence was displayed also by vitamin B₁ and nicotinic amide and it is ascribed to an increase in the rate of pollen germination and pollen tube growth. Other vitamins of the B group, vitamin C and various minor elements tested were without effect; calcium glycerophosphate increased pollen germination and fruit set though pollen tube growth was not affected.

545 RICHARDS, A. V.

Progress of selection work on cacao.

Trop. Agriculturist 1953 : 109 : 19-25.

The results of selective clonal propagation and particulars of new clones introduced from abroad are given. Studies on pollen compatibility of cacao trees were made.

546 **Cocoa collecting in Columbia.**

J. Agric. Soc. Trinidad & Tobago 1953 : 53 : 18-19.

The itinerary and findings of the recent expedition to collect cacao types and related species in Colombia are briefly described (cf. *PBA*, Vol. XXIII, Abst. 559). The results have led to the general conclusion that only Amazonian Forastero cacao of poor quality is to be found along the main rivers of southeast and east Colombia; further exploration should be in the upper reaches and tributaries of the Putumayo and Caqueta rivers near the borders of Ecuador and Peru.

547 EDEN, D. R. A. & EDWARDS, W. L.

Cocoa plantation management in Western Samoa.

Tech. Pap. S. Pacific Comm. 1952 : No. 31 : Pp. 20. (Mimeographed).

Progress is reported in replacing low-yielding trees by the progeny of selected high-yielding trees. One tree named Lafi 7 has been discovered which, in addition to having an exceptionally high yield, has proved completely free from *Phytophthora* during the four seasons it has been under observation, although it was surrounded by infected trees. Vegetative propagation of this tree is to be carried out.

MINOR CROP PLANTS

548 HÖRBERG, Y.

Weibulls Margo. Ny höstraps. (Weibull's Margo. A new winter rape).

Weibulls Årsb. 1953 : p. 11.

More information is given on the performance of the variety Margo already noted in *PBA*; Vol. XXIII, Abst. 2125.

549 **Hybrids boost castorbean yields.**

Agric. Res., Wash. 1953 : 2 : No. 1 : 6-7.

Seed of high-yielding F₁ hybrids is expected to be available in spring 1954 in the United States. The seed is produced by crossing 100% male-sterile plants of N 145-4 with an inbred variety as pollinator. In field tests during 1952, the hybrids outyielded commercial varieties by 15 to 20%.

550 BEREŽANOVA, K. T.

(The sesame Belosemjannyi M-7).

Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 3 : p. 70. [Russian].

Belosemjannyi M 7 [White-seeded M 7] was obtained by continuous selection in Turkmenia of a brown-seeded sample originating from the Institute of Plant Industry. The material was improved by sowing a month later than the normal sowing time. It is more productive and has a higher oil content and 1000 seed weight than the standard Taškent 122.

551 KOBAYASHI, T. & SHIMAMURA, T.

Morphological and cytological studies on induced polyploidy in *Sesamum indicum* L.

Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 157-71.

A study was made of colchicine-induced polyploidy in *S. indicum*. Treatment with colchicine produced a high percentage of 4n plants. These were more vigorous and produced larger and thicker leaves and stems than the diploids. At first the rate of growth of the tetraploid plants was much slower than that of the diploids, but after the first 40 days this trend was reversed. Meiosis in the 4n plants was regular and pollen and seed fertility high. Yield of seeds per plant was however poor, which precludes the cultivation of polyploid sesame to increase oil yield.

552 CULBERTSON, J. O.

Registration of flax varieties VI.

Agron. J. 1953 : 45 : 317-18.

The linseed Marine, recently registered in the United States, is described (cf. *PBA*, Vol. XXII, Abst. 1003).

553 Forsøg med Sorter af Oliehør 1949-1952. (Trials with varieties of linseed 1949-52).

Tidsskr. Frøavl 1953 : No. 490 : 152-54.

Trials of eight varieties of Danish, Swedish and Argentine linseeds (cf. *PBA*, Vol. XXII, Abst. 2168), tested at three experimental centres in Denmark, are recorded, with tables showing the

yield of seed and straw, the crude oil content, length of stem, seed weight, date of ripening and tendency to lodging. The Danish variety, *Trifolium Rekord* [*Trifolium Rekord*], gave the highest yield of seed per ha. and ranked second as regards total yield of crude oil, but in general its yield of straw was low.

554 RUSSELL, W. A.

A study of the inter-relationships of seed yield, oil content, and other agronomic characters with sunflower inbred lines and their top crosses.

Canad. J. Agric. Sci. 1953 : 33 : 291-314.
Experiments were carried out during 1949 and 1950 on a large number of inbreds and their top crosses with the variety Sunrise at the Agricultural Experimental Station, Morden, Man. In both years, number of days to flowering, plant height and rating for rust infection in the inbreds were positively and highly correlated with the same characters in the top crosses. No definite relationships were detected between ten plant characters of the inbreds and combining ability, as expressed by yields, in the top crosses. This behaviour may have been due to the fact that use of Sunrise as top-cross parent may have involved some measure of specific rather than general combining ability. Self fertility of the inbreds when bagged and the amount of hybridization under conditions of open pollination showed a highly significant negative correlation. In the inbred tests for both 1949 and 1950 and in the top-cross test of 1950, oil content and kernel content had a positive and highly significant correlation. With respect to oil content, the inbreds and their top crosses exhibited a positive correlation, significant in 1949 and highly significant in 1950. The multiple correlation coefficient indicating the effect of eight inbred characters upon oil content was significant in 1949 and highly significant in 1950. The value of the results in selecting suitable inbreds for hybrid production, and possible methods of testing general combining ability are discussed.

555 **Quarterly Progress Report of the West African Institute for Oil Palm Research.** 1953 : No. 5 : Pp. 18.

Data are presented on a number of progeny trials conducted in the second quarter of 1953. Various crosses, using *dura*, *pisifera* and *tenera* types as parents, were made, and local palms were crossed with Malayan and Congo palms. Experiments on pollination and pollen viability continued.

556 VANDERWEYEN, R.

Le croisement "*dura* x *pisifera*" et ses premiers résultats. (**The cross "*dura* x *pisifera*" and its initial results**).

Bull. Inform. INEAC 1953 : 2 : 123-36.

Oil palm plantations raised from *dura* x *pisifera* seed on an industrial scale confirmed the theory that all *dura* x *pisifera* crosses should yield 100% *tenera* palms. The stands contained 95-100% *tenera* trees and no *pisifera*; any *dura* specimens found were probably due to impurity arising during pollination or to some other accidental cause.

557 LOS, D. W. R. & SMULDERS, W. L. A.
Handbestuivingen in de oliepalm.
(**Pollination of the oil palm by hand**).
Bergcultures 1953 : 22 : 161-67.

The technique used in pollination by hand is described. At the Marihat estate near Pematang Siantar in the Netherlands East Indies, the method yielded 82.9% of large kernels and 17.1% of small in *dura* x *pisifera* crosses. The percentage of unsuccessful pollinations was 1.78 out of a total of 16% of crowns rejected for various reasons, e.g. abortion, abnormal development and absence of kernels.

558 PURVIS, C.

Controlled pollination of the oil palm.

J. W. Afr. Inst. Oil Palm Res. 1953 : No. 1 : 60-67.

Various methods of controlled artificial pollination are discussed, together with their importance in breeding work.

559 WESTENBERG, M. G.

Normale en abnormale producenten bij Deli-*dura*-palmen. (**Normal and abnormal producers in Deli *dura* palms**).

Bergcultures 1953 : 22 : 127-35.

Two populations and a single family obtained by selfing of the above type of palm were analysed for the incidence of (1) restricted period of production, and (2) malformations due to crown disease and other causes. A possible genetical mechanism to explain the mode of inheritance of these two characters, based on the assumption that each is caused by a group of homozygous recessives, is propounded.

560 KOTUKOV, G. N.

(**Obtaining interspecific hybrids in the genus *Digitalis***).

Bot. Zh. (Bot. J.), Moskva 1953 : 38 : 434-38. [Russian].

Breeding *D. purpurea* for hardiness, involving interspecific hybridization and back crossing, at

Kiev is discussed. Reference is made to recent breeding of Rozovyi Gibrid [Pink Hybrid], which was first bred from *D. purpurea* x *D. ambigua* in 1926. It is interesting on account of its hardiness, productiveness, perennial habit and absence of cumulative toxic effects.

- 561 EBES, K.
The thickness of bark and bark per dm² of *Cinchona*.

Netherlands J. Agric. Sci. 1953 : 1 : 54-58.

An analysis of yielding capacity in stands of *C. ledgeriana* at Buitenzorg, Java, revealed a low correlation ($r = +0.208$) between bark thickness and yield of dry bark per tree. Relationship between amount of dry bark per dm.² and bark thickness showed variability, both from clone to clone and within each clone.

- 562 BROOKSON, C. W.
The breeding and selection of *Hevea brasiliensis*.

Arch. Rubbercult. 1953 : extra number : 96-106.

The breeding programme of the Rubber Research Institute of Malaya is reviewed and suggestions made as to future approaches to the problem. Inbreeding appears to have an adverse effect on both yield and vigour of plants. As the number of seedlings from which *Hevea* in Malaya originated was extremely small, the breeding material available already possesses a high degree of homozygosity. The possibility of obtaining heterosis and strains resistant to disease is discussed.

- 563 EVERS, E.
Pratique de la présélection en hévéaculture. (Practical aspects of pre-selection in *Hevea*).

Conf. CR Journées Caoutch., Bruxelles, 10-11 mars 1953 : 23-32.

At a meeting of the Organisation internationale pour l'Extension de l'Emploi du Caoutchouc [International Organization for the Promotion of Rubber Utilization], held in Brussels on 10 and 11 March 1953, one of the subjects discussed was the Testatex method of estimating the future yield of two-year-old rubber plants.

An early superiority in yield of rubber is maintained throughout the life of the plant. A process of selection eliminating one third of the plants in a given plantation results in the average yield rising by 20%. The theoretical ideal would be to retain only 10% of young plants.

- 564 **Report of the work of the Rubber Research Board in 1952.**

Rubb. Res. Inst. Ceylon 1953 : Pp. 102.

Extensive experiments into the growth and yield of various clones and clonal seedlings were made and data on the results of clonal trials are given. A number of clones were introduced from other countries.

Breeding for resistance to *Oidium* is in progress.

- 565 BURKILL, H. M.
Performance of clones and clonal seedling families in large-scale experiments on estates.

Arch. Rubbercult. 1953 : extra number : 107-16.

Clones and clonal seedlings are compared as to yield and vigour on the basis of 15 years' observations.

- 566 TYSDAL, H. M. & RANDS, R. D.
Breeding for disease resistance and higher rubber yield in *Hevea*, guayule, and kok-saghyz.

Agron. J. 1953 : 45 : 234-43.

A general review is given of breeding in progress to increase yields of rubber in the United States and tropical America, with special reference to the following: selection of (*Hevea brasiliensis* x *H. benthamiana*) x *H. brasiliensis* back crosses, with resistance to *Dothidella ulei*, at Belterra, Brazil; increasing the size, and consequently the yield per plant, of guayule individuals in Texas by crossing *Parthenium argentatum* with *P. stramonium*, *P. tomentosum* and *P. fruticosum*, and back-crossing to guayule; selecting *Parthenium* hybrids with resistance to charcoal rot (*Sclerotium bataticola*) in southern Texas; and selection of *Taraxacum kok-saghyz* for superior vigour in Oregon.

- 567 HOEDT, Th. G. E.
Opmerkingen over *Hevea*-selectie in Z.O.-Azie en Latijns Amerika in verband met het optreden van *Dothidella ulei*. (Remarks on *Hevea* breeding in Southeastern Asia and Latin America in connexion with the occurrence of *D. ulei*).

Arch. Rubbercult. 1953 : 30 : 1-37.

Drawing upon the experience gathered during a visit to rubber plantations in the Amazon and other parts of Brazil, the author emphasizes the urgent need for international cooperation in efforts to breed leaf-blight resistant rubber for Indonesia and to evolve a system of defence against the entry of the disease into S.E. Asia.

The difficulties of obtaining resistant material for breeding operations in S.E. Asia and of testing clones and seedlings for yield and resistance, without introducing the disease into that area, are fully discussed.

FRUITS AND NUTS

- 568 ANJOU, K.
Studieresa i Europa. (**A study tour in Europe**).
Sverig. Pomol Fören. Årsskr. 1952 : 108-29.

This report records the impressions of a Swedish horticulturist concerning the production of horticultural fruits, including nuts and hops, in Denmark, the Netherlands, Belgium, France, Switzerland and Germany.

- 569 **The Annual Report of the Agricultural and Horticultural Research Station (The National Fruit and Cider Institute), Long Ashton, Bristol, 1952 :** Pp. 302.

Williams, R. R. Pollination requirements of cider apple varieties. Progress report, 1952. (pp. 44-48).

Tests were made of the germinative capacity of pollen of 24 cider varieties with the aim of selecting the most suitable varieties for cross pollination. With one exception, the varieties tested fell into two sharply defined groups, the first having germination rates of below 30%, the second of over 70%. Varieties considered to be good pollinators are tabulated, together with the results of self-pollination and cross-pollination tests in each case.

Crang, A. & Sturdy, M. A comparison of some varieties of fruit preserved by bottling and by freezing. Progress report III. (pp. 177-85).

The comparison of the suitability of various varieties of cherries, blackberries, strawberries, gooseberries, plums, apricots and citrus for bottling and freezing purposes was continued during 1952 (cf. *PBA*, Vol. XXIII, Abst. 141).

Crang, A. & Sturdy, M. A comparison of some varieties of vegetables preserved by canning and by freezing. Progress report II. (pp. 185-91).

The comparative results are given of preserving different varieties of beans, peas, carrots and spinach by canning and freezing (cf. *PBA*, Vol. XXIII, Abst. 1513).

- 570 BREVIGLIERI, N.
Il miglioramento genetico delle razze per la coltura industriale. (**The genetic improvement of varieties for industrial cultivation**).
Humus, Milano 1953 : 9 : Nos. 6-7 : 30-37.

The progress in fruit breeding in various countries of Europe and in America is reviewed, as a basis for the author's suggestions for a programme for Italian breeders of apples, pears, plums and grapes. Selection and breeding will require the establishment of experimental orchards in the main fruit growing regions for the study and subsequent spread of the best varieties in collaboration with research institutes.

- 571 SJUBAROVA, È.
(**New varieties of fruit trees**).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 5 : 23-25. [Russian].

Several productive and hardy varieties of pome and stone fruits, noted for the good quality of their products, have been bred at the White Russian Horticultural Research Station.

Apple. Descriptions are given of Ozimoe [Winter] and Stoikoe [Sturdy], showing resistance to diseases, Nesravnennoe [Incomparable], Minsk and Šchedroe [Generous] which come into bearing early and Belorusskii Sinap [White-Russian Sinap], which has good keeping properties.

Pear. Beurré Lošickaja, from Beurré Sluck x Kurskaja Moldavanka [Kursk Moldavian], possesses resistance to diseases, and Seedling 4/5 111, derived from Dobraja Luiza [Good Louise], produces fruits which keep for several weeks.

Plum. New varieties include Stahanovka [Stahanovite], showing resistance to diseases and Krupnoplodnaja [Large-fruited] whose fruits weigh 65 grm. each.

Cherry. Nairannejšaja [Ultraearly], Novodvorskaja and Kistevaja [Cluster], so named because its fruits are borne in threes, fours or still larger clusters, are sour cherries which possess resistance to grey rot. Of the sweet cherries, Zolotaja Lošickaja [Golden Lošickaja] is interesting for its early bearing and Krasavica [Beauty] and Pobeda [Victory] for their large fruits.

- 572 Jahresbericht 1949-1951 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil. (**Annual report for 1949-1951 of the Federal Experimental Station for Viticulture and Horticulture in Wädenswil**).
Landw. Jb. Schweiz 1952 : 6 : 563-699.

Details are given of the selection of new varieties

of beans and other vegetables, together with the comparative suitability for freezing purposes of different varieties of fruits and vegetables.

Apples. A report is given on new varieties resulting from experimental crossings. The keeping qualities of a number of varieties were compared.

Pears. The keeping qualities and suitability for drying of a number of varieties were compared.

Strawberries. Successful experiments in the breeding of varieties of large strawberry with improved taste are in progress.

Grapes. In variety tests, Blauer Burgunder [Blue Burgundy] and the hybrid Riesling x Sylvaner proved superior in quality and yield among black and white grapes respectively. Results are given of improvements effected in Blauer Burgunder by means of clonal selection.

Onions. The results are given of experiments in breeding new varieties of superior quality and greater keeping power.

573 More new varieties.

Agric. Res. 1953 : 2 : No. 3 : p. 13.

Two new varieties of lettuce have been announced by the US Bureau of Plant Industry, Soils and Agricultural Engineering.

Alaska is a large, dark green, late-maturing lettuce, giving a high yield and resistant to tip-burn and anthracnose. It is especially suited to Alaskan conditions.

Jade, a large, very dark green, midseason variety with savoyed leaves shows considerable resistance to cold. It is suitable for the south west of the USA.

Two new varieties of peach are also announced. Coronet is an early yellow peach recommended for the southern States to replace the variety Dixigem.

Maygold, a yellow clingstone peach, requiring only a short period of cold to break its period of dormancy, is recommended for the most southern States.

574 RAPTOPOULOS, TH.

Zeitpunkt und Dauer der Blüte bei verschiedenen Obstbäumen. (**Time and duration of blossoming in different fruit trees**).

Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1953 : 3 : 200-05.

Tables are presented of a number of varieties, in order of blossoming, of apple, pear, apricot, plum, sweet and sour cherry, peach and almond.

Data on length of period of blossoming are also given, thus enabling varieties whose blossoming coincides or overlaps, and which are consequently available for cross-pollination purposes, to be selected. Late blossoming varieties are least susceptible to damage by frost.

575 NILSSON, F.

Nya frukt- och bärsorter i Engelska försök. (**New varieties of fruits and berries in English trials**).

Sverig. Pomol. Fören. Årsskr. 1952 : 22-25.

Swedish readers are provided with a review of varietal experiments, carried out at horticultural research centres in England, on pome and stone fruits and on berries. The performance of some of these varieties, when tested in Sweden, is recorded.

576 ELLENWOOD, C. W., HOWLETT, F. S., JUDKINS, W. P. & HILL, R. G. (JUN.)

Fruit varieties for Ohio.

Res. Circ. Ohio Agric. Exp. Sta. 1953 : No. 21 : Pp. 59.

Varieties of apples, pears, apricots, plums, cherries, peaches, nectarines, grapes and soft fruits recommended for cultivation in Ohio are listed and evaluated.

577 LANTZ, H. L.

Evaluation of new tree fruits for Iowa.

Trans. Iowa Hort. Soc. 1952 (1953) : 87 : 46-52.

Detailed particulars are given of new varieties of apple, pear, plum and peach trees suitable for Iowa.

578 CARLONE, R.

Effetto della riduzione degli stili funzionanti sulla fecondazione di alcune varietà di melo e di pero. (**The effect of reducing the number of functioning styles on fertilization in certain varieties of apple and pear**).

Genet. Agr. 1953 : 3 : 193-203.

Removal of one or more of the stigmatic lobes reduced the number of fruits which set and survived the June drop, the reduction being proportional to the number of lobes removed; when all 5 were removed no fruit set at all in the diploid apples. The fruit weight and the number of seeds per fruit were also reduced, though some seeds were formed in carpels corresponding to the lobes removed. The reduction was greater in triploid than in diploid varieties and the number of empty locules was greater in the pears than the apples.

- 579 HOWLETT, F. S. & FOWLER, T. E.
Melrose apple is one of three varieties developed at Station.

Fm. Home Res. 1953 : 38 : 60-61, 63.

Details are given of the performance of the late-maturing and late-keeping variety Melrose, developed from Jonathan x Delicious (cf. *PBA*, Vol. XVI, Abst. 1597).

- 580 N., F.
Hybrid mellan äpple och päron. (Hybrid between apple and pear).

Svensk JordbrForsk. 1953 : p. 102.

Reference is made to unsuccessful attempts to cross apples and pears in Sweden, and to results obtained at the John Innes Horticultural Institution in 1951 (cf. *PBA*, Vol. XXIII, Abst. 2939).

- 581 Een rode James Grieve. **(A red James Grieve).**

Fruittteelt 1953 : 43 : p. 727.

A red sport of the above variety with the same taste and appearance as the common form is recorded from Germany.

- 582 BREVIGLIERI, N.
 Studi e ricerche sulla biologia florale e di fruttificazione del melo nel Ferrarese. Parti I-V. **(Studies and researches on the flower and fruit biology of the apple in the Ferrara Province. Parts I-V).**

Ann. Sper. Agr. 1953 : 7 : 97-136; 401-37; 759-806; 1095-140; 1381-420.

The first part of this monographic study presents a full examination of the factors determining fruit bearing and fertility interrelationships. In the second part information is given on cytological anomalies tending to sterility of male and female organs, the normal course of fertilization and various anomalies, and phenomena of pollination, methods of artificial pollination, problems of sterility and incompatibility.

Part III is devoted to a consideration of the effect upon fruit production of various nutritional and climatic factors, and of low temperatures. The incidence of parthenocarpy is discussed and data are presented on dates of flowering of a number of varieties, together with information on number of flowers per inflorescence, amount and germinating capacity of the pollen and length of pollen tube in culture solution after a given length of time. Lists are given of good and bad pollen producers.

In the fourth part the merits of various methods of isolation are discussed. Data are provided concerning the characteristics of the pistils and

the pollen in a number of apple varieties studied and their degree of self compatibility and cross compatibility with other varieties, the results obtained in the years 1948-51 being presented in extensive tables. A number of self-incompatible varieties are enumerated.

The fifth part presents the results of self pollination. Very few of the varieties set fruit on selfing and even these gave much better sets from cross pollination. Tabular data for the number of seeds per fruit show that the seeds from self pollination are less in number and in weight.

Certain cases of metaxenia were observed in the cross pollinations and the literature on the subject is reviewed.

A final summary statement is presented in which for each variety the percentage fruit sets from open pollination, selfing and pollination with other varieties are reported, and on the basis of this information some practical suggestions for planting orchards to give the most efficient production are given.

- 583 ISAEV, S. I.
(New summer varieties of apple).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 8-13. [Russian].

Several productive and hardy varieties, with fruits of good quality, which have been bred at Mičurinsk and have reached the trial stage, are described. Grušovka Rannjaja [Early Pear] from Grušovka Moskovskaja [Moscow Pear] x Papiroverka and Papiroverka Rannjaja [Early Papiroverka] from Papiroverka x Šafran Kitaika [Saffron Chinese Crab] reach maturity in July; others in August. The new late summer varieties include Medunica [Honey] from Wealthy x Koričnoe Polosatoe [Striped Brown] and Pionerskoe [Pioneer] from Koričnoe Polosatoe x Papiroverka, which are interesting for their high sugar content. Some of these new varieties were trained for hardiness on stocks of the hardy hybrids Papiroverka x Grušovka Moskovskaja, Grušovka Moskovskaja x Borovinka or Koričnoe Polosatoe x Borsdorf Kitaika [Borsdorf Chinese Crab].

- 584 BUCKIH, S.
(The horticulturists and experimentalists of Mičurinsk).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 59-60. [Russian].

Reference is made to some new varieties of fruit trees and soft fruits, including some productive and hardy apples with fruits of good quality, developed at Mičurinsk.

- 585 ANJOU, K.
Päronodlingen och dess sortfrågor.
(**Pear orchards and variety problems**).
Sverig. Pomol. Fören. Årsskr. 1952 :
52-63.

The varieties of pears available to Swedish growers are tabulated, on the basis of hardiness, and discussed, together with the problem of suitable stocks. Some old local varieties such as Hovsta and the Angusti, Sörmland and Johantorp pears are hardy, but, in general, deficient in flavour. The Påskpäron [Easter pear] and the Johantorp pear keep well.

Results of pear breeding in various European countries are mentioned and the breeding work at Balsgård is reviewed (cf. *PBA*, Vol. XXIII, Abst. 2152); hardiness and earliness in combination with superior quality are among the aims in view. Suitable late varieties and hardy stocks are also needed by Swedish growers.

- 586 Twee rassen van Legipont of een geval van mutatie? (**Two varieties of Legipont or a case of mutation?**)
Fruittelst 1953 : 43 : 726-28.

An aberrant form of the Legipont pear, with heavier and broader fruits, is recorded from Schellinkhout in the Netherlands. It is less fertile than the original type of Legipont and the skin of the fruits is greyer, though their flavour and flesh are unaltered.

- 587 JAKOVLEV, P. N.
(**Breeding pears in the central and northern zones of the USSR**).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 5-8. [Russian].

At Mičurinsk, some promising hardy material was obtained by raising the seedlings of Bere Oktjabrja [October Beurré] and Bere Zimnjaja Mičurina [Mičurin's Winter Beurré] and by crossing the Mičurin varieties Dočj Blankovoï [Blankova's Daughter] and Bere Zimnjaja Mičurina and *Malus ussuriensis* with some cultivated southern pears.

- 588 *VENJJAMINOV, A. N.
(**The development of new varieties of apricot by directed training**).
Agrobiologija (Agrobiology) 1953 : No. 3 : 9-18. [Russian].

Some apricots combining good fruit quality with winter hardiness, obtained by wide hybridization and training upon winter-hardy plum or apricot stocks at Voronež, are described.

- 589 KOLESNIKOV, M. A.
(**New varieties of plum**).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 58-59. [Russian].

Several productive and hardy varieties of plum showing resistance to diseases have been bred at the Krasnojarsk Horticultural Research Station. Their blue fruits have flesh of good flavour and are suitable for making prunes. Sejanec P-19, from Anna Spät x Rannjaja Diapre [Early Variegated], and Izjum Kubanskii [Kuban] Raisin], obtained by free pollination of Rannjaja Diapre, reach maturity in September and Sejanec VII-17 [Seedling VII-17] and Sejanec VI-18 in August-July, respectively. The last two varieties were derived from open-pollinated Hungarian Ugorka.

- 590 DERMINE, E. & LIARD, O.
Identification et description des variétés du prunier européen. (**Identification and description of varieties of European plum**).
Rev. Agric., Brux. 1953 : 6 : 1203-255.

To eliminate present confusion in the classification of varieties of *Prunus*, a study of the flowers, fruits and stones of European plums was undertaken at the Gembloux Station for the Breeding of Horticultural Plants, in order to determine the most reliable diagnostic criteria. On the basis of the results obtained, the identification and description of plums grown in Belgium and other European countries can now be begun, and descriptive lists of the different varieties are to be published from time to time.

- 591 KRAVČENKO, P. A.
(**New varieties of plum in Siberia**).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 8 : p. 68. [Russian].

Some hardy material, showing resistance to drought and diseases, has been selected from locally grown Ussurian plums and seedlings of Opata. The new plums produce good quality fruits weighing 10-18 g. They reach maturity in August and have good keeping properties.

- 592 KONDRAŠIN, A. S.
(**Plums in the Kurgan province**).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 7 : 26-29. [Russian].

Several plums producing good quality fruits and as hardy as Ranetka Purpurovaja [Purple Reinette] have been developed in recent years at Kurgan, Siberia. Some of these varieties are seedlings selected from the Karzinskaja

* An extended summary of this paper is on file at the Bureau.

plum, others have been obtained by vegetative reproduction of the same material, grown locally, and, lastly, a large-fruited hardy seedling, Želtaja Rannjaja [Early Yellow], originated from the Čeljabinsk Horticultural Station. The latter is regarded as promising breeding material.

593 AHUNDZADE, I. M.

(**A valuable variety of sloe**).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 8 : 68-69. [Russian].

A cultivated variety of sloe, Širvan-Gegami, found in Azerbaidžan, is regarded as promising budding material. It is moderate in its requirements and shows resistance to drought. The fruits weigh 7.5-8.5 g. and their flavour and keeping properties are good. A tree produces 35-70 kg.

594 ORATOVSKIĬ, M. T.

(**Overcoming nonviability of the seed in early sweet cherry varieties**).

Agrobiologija (Agrobiology) 1953 : No. 2 : 109-113. [Russian].

New early varieties, bred at Melitopolj, include Melitopoljskaja Rannjaja [Early Melitopolj] and Skorospelka [Early], which produce fruits twice as large as Rannjaja Marka [Early Stamp] and with a higher sugar content. A method of producing viable seed of early cherries has been developed and some seedlings of Rannjaja Marka so raised were crossed with Jaboulais, Pink Napoleon and Denissena Želtaja [Bigarreau Dönnissen].

595 LAMB, R. C.

(**Notes on the inheritance of some characters in the sweet cherry *Prunus avium***).

Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 293-98.

Data are given on the inheritance of such characteristics as flesh colour, flesh texture, size and quality of fruit and time of ripening of the sweet cherry. The results of intervarietal crosses are tabulated.

596 MANARESI, A.

(**Ricerche sull'impollinazione del ciliegio col metodo normale e col metodo "spur-unit". (Investigations on pollination of the cherry by the normal method and the "spur-unit" method)**).

Riv. Frutticoltura. Viticoltura. Orticoltura. 1953 : 15 : 169-82.

Results are tabulated showing that the ten Italian varieties of bigarreaux and geans

tested were self incompatible and that parthenocarp did not occur. Suitable pollinators are recommended.

597 MORETTINI, A.

(**L'Amarena di Pescara, la sua selezione, le caratteristiche della razza e la coltura industriale. (Amarena di Pescara, its selection, the characteristics of the variety and its commercial cultivation)**).

Riv. Ortoflorofruttic. Ital. 1953 : 37 : 115-28.

Amarena di Pescara [Pescara sour cherry], an improved small variety with not too acid fruit, suitable for commercial utilization, is described.

598 PAUNOVIĆ, S. A.

(**Mosaic in some peach varieties**).

Zaštita Bilja (Plant Protection), Beograd 1953 : No. 18 : 49-54. [Serbian].

Of the many varieties of peach investigated at Čačak and in the Ljubić-Trnava district, only La France, Krupna Badenska [Large Baden], Kineska Pljosnata [Chinese Flat-fruit] and Griepenkerl appeared to be susceptible to mosaic.

599 KOVALEV, N. V.

(**The origin of the nectarine and the smooth-skinned apricot**).

Agrobiologija (Agrobiology) 1953 : No. 3 : 64-66. [Russian].

Some arguments against theories of the origin of the nectarine by bud mutation from the peach or by hybridization between peach and plum or almond and plum are presented. In the writer's view the nectarine is a product of conversion from the peach. Reference is made to many nectarines which are believed to have so evolved from the peach in Central Asia. The smooth-skinned apricot is regarded as having originated from a pubescent form of apricot in the same manner as the nectarine from the peach.

600 RUSSO, F. & TORRISI, M.

(**Problemi e obiettivi di genetica agrumaria. Parte I. Selezione degli ibridi, degli embrioni nucellari, dei triploidi e provocazione artificiale di mutazioni. (Problems and objectives in citrus genetics. Pt. I. Breeding of hybrids, nucellar embryos and triploids, and artificial induction of mutations)**).

Ann. Sper. Agr. 1953 : 7 : 883-906.

Progress during the past 50 years in the breeding of citrus fruits in various countries is reviewed.

Research at the experimental station at Acireale, Sicily, has included: intrageneric, interspecific and intervarietal crosses; the use of plants raised from nucellar embryos as breeding material (cf. *PBA*, Vol. XXI, Abst. 2126); the production of triploids; and artificial induction of mutation in hybrid forms by X irradiation or electromagnetic treatment of pollen. Preliminary results of work on mal secco resistance in varietal hybrids suggest that resistance may be associated with multiple factors or that the character was in the dominant heterozygous condition in the parents used in the crosses in question.

- 601 JANAKI AMMAL, E. K.
A new interspecific citrus hybrid.
Curr. Sci. 1953 : 22 : 178-79.

A natural hybrid between the citron (*Citrus medica*) and Malta lemon has been discovered at Shoranur, South Malabar, India, the latter parent being a form intermediate between the lime (*C. aurantifolium*) and lemon. The hybrid has been termed a citrolemon and given the name Sukumari. It has the thick, sweet rind of the citron, and resembles the Malta lemon in producing its fruits in bunches. The hybrid and both parents have a chromosome number of $2n = 18$.

- 602 DŽORBINADZE, A. M.
(Vegetative hybrids between citrus fruits).
Agrobiologija (Agrobiology) 1953 : No. 3 : 124-27. [Russian].

Breeding citrus fruits for hardiness at Batumi includes the method of vegetative rapprochement, mostly involving the hardy *Poncirus trifoliata* as a stock. Its effects upon some grafted lemons and oranges are mentioned briefly. Reference is also made to a sucker produced by a frost-damaged tree of the Unshu (= Satsuma) mandarin, which bore no resemblance to either the mandarin or the *P. trifoliata* stock, and showed a deciduous habit in the first year. The same tree produced also mandarin and *P. trifoliata* suckers.

- 603 BITTERS, W. P. & PARKER, E. R.
Quick decline of citrus as influenced by top-root relationships.
Bull. Calif. Agric. Exp. Sta. No. 733 : Pp. 35.

Varietal differences in the susceptibility of *Citrus* rootstocks to attack by the quick decline virus are given.

- 604 RUSSO, F.
Una pregevole mutazione vegetativa del "Sanguinello Moscato" l'arancio "Moscato Cuscunà". (**The orange Moscato Cuscunà, a valuable vegetative mutation of Sanguinello Moscato**).
Ann. Sper. Agr. 1953 : 7 : 907-13.

The fruits of this Italian mutant are juicy, with a thin skin, slightly tinged with red; the ratio of sugars to acids is high and the flavour excellent. Yields are regular and high.

- 605 REDŽIĆ, M.
(A study of the fig varieties in the subtropical zone of Montenegro).
Arh. Poljopr. Nauk. 1951 : 4 : 112-39. [Serbian].

The principal Montenegrin varieties of fig trees are described.

- 606 PIRZADA, A. G.
Progress of mango cultivation in Sind with special reference to Bharati varieties.
Agric. Pakist. 1952 : 3 : 98-99.

An account is given of mango cultivation in Sind, of varieties suitable for this district, and of susceptibility to attack by insects and disease.

- 607 MUKHERJEE, S. K.
Origin, distribution and phylogenetic affinity of the species of *Mangifera* L.
J. Linn. Soc. (Bot.) 1953 : 55 : No. 356 : 65-83.

The author surveys his comprehensive investigations on the genus *Mangifera*, discussing the phylogenetic taxonomy, past and present phyto-geography, the origin of the genus, and the evolution of the species and their migration (cf. *PBA*, Vol. XIX, Abst. 2060; Vol. XX, Absts. 1879 & 2589; Vol. XXI, Abst. 1330; Vol. XXII, Abst. 1729; and Vol. XXIII, Abst. 2956).

- 608 ALBEN, A. O., SITTON, B. G., DODGE, F. N. & HARRIS, O. W.
Comparative growth and yield of Stuart, Success, and Schley pecan varieties.
Proc. Amer. Soc. Agric. Sci. 1953 : 61 : 307-10.

Three varieties of pecan under cultivation at the Pecan Field Station, Shreveport, Louisiana, were compared as to growth and yield. The variety Success gave the best yield, but was inferior in quality to Stuart and Schley. The varieties Success and Schley matured earlier than Stuart.

609 KAPETANOVIĆ, N.

Prilog poznavanju pitomog kestena u slivu gornje Neretve. (**A study of the chestnut in the upper Neretva basin**).

Arh. Poljopr. Nauk. 1952 : 5 : 145-55.

The wild chestnuts of this region show great variability in respect of earliness and appearance and quality of the fruits. Some promising forms, found near Seonice, are briefly described.

610 OLDÉN, E. J.

Frysningförsök med hasselkvistar vid Balsgård vintrarna 1950-51 och 1951-52. (**Freezing experiments with hazel twigs at Balsgård during the winter 1950-51 and 1951-52**).

Sverig. Pomol. Fören. Årsskr. 1952 : 76-92.

In order to discover hardy varieties for use in breeding operations, especially types whose catkins are resistant to low temperatures, 14 varieties of cultivated hazel and about 30 wild types selected from 1500 *Corylus avellana* bushes, were tested in the low temperature laboratory at the Balsgård Fruit Breeding Institute (cf. *PBA*, Vol. XXI, Abst. 2985).

The wild types withstood temperatures 5-10° C lower than the large-fruited varieties. During dormancy the catkins proved more sensitive to freezing than the female inflorescences; but later in the winter there were no significant differences in hardiness between the male and female flowers.

The effect of freezing upon subsequent germination of the pollen in wild types and in commercial varieties was studied. Length of freezing period is an important factor in determining the amount of injury to plant and pollen.

611 New almond variety released by California.

Sth. Seedsman 1953 : 16 : No. 7 : p. 95.

Davey, an almond with desirable tree growth, giving high yields of good quality nuts, has been released by the California Agricultural Experiment Station. It is a useful pollinator for Nonpareil and is more tolerant of sodium soils than Mission.

612 The cultivation of groundnuts in West Africa.

OEEC, Paris 1953 : Pp. 54.

The report is given of a mission which visited Nigeria, Senegal, Portuguese Guinea and Gambia in 1952 to study the various aspects of groundnut production, including breeding and selection. Among the general recommendations made is the suggestion that an expedition should be sent

to South America to search for rosette-resistant strains, and for late-maturing forms offering the possibility of extending groundnut production in regions with a long rainy season.

613 FERRAND, M.

La sélection de l'arachide. (**Groundnut breeding**).

Oléagineux, Paris 1953 : 8 : 357-62.

The results of recent researches in different countries are given, together with details of new strains obtained. Data are included on methods of selection and propagation, mutations and hybrid varieties.

614 PRATIN POLCHART [PRATHIN PHOLCHATI]. (**Durian orchards in the Thonburi district**).

Kasikon(r) (Farmer), Bangkok 1952 : 25 : 505-14. [Siamese].

A list is given of 129 durian varieties grown in the above district. They are classified into two groups on the basis of the age at which bearing commences.

615 EICHORN, A.

Contribution à l'étude caryologique des palmiers. (**Contribution to the caryological study of palms**).

CR Acad. Sci. Paris 1953 : 236 : 315-16.

In *Ptychosperma macarthuri*, $2n = 32$; in *Chamaedora pumila*, $2n = 26$. In both species marked polymorphism, as between adjacent cells, was noted in the inter-phase nuclei. This is due to the presence of peripheral chromatic masses, which vary considerably in number and disposition. Their development from the preceding telophase nuclei is described.

616 COOK, J. A. & FURR, J. R.

Kinds and relative amounts of sugar and their relation to texture in some American-grown date varieties.

Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 286-92.

Fifty-one varieties of dates grown in the USA are compared as to total sugars and sucrose content.

617 BALDINI, E.

Contributo allo studio delle razze di olivo coltivate in Toscana. Indagini condotte in provincia di Firenze. Parte I. (**Researches on the olive varieties of Tuscany. Investigations in the province of Florence. I.**).

Ann. Sper. Agr. 1953 : 7 : 1675-700.

Some 16 olive varieties are at present cultivated in the province. Historical notes are given on

certain olives cultivated in the past, from which it is possible to shed light on the origin of some of the present-day varieties. Data are presented on pollen production and the degree of abortion of the ovaries; that variations in the latter feature are due to varietal differences is indicated by observations on mixed trees originating by grafting, and by the fact that constant differences are detectable between varieties, and even between different clones of the same variety, when studied over a number of years. Data are also given on self and cross compatibility of the varieties, the majority of them being self incompatible. The two main varieties of the province, Frantoio and Moraiolo, were pollinated artificially with the other varieties and the percentage set is recorded, together with that from self and open pollination. The former variety proved self compatible but the set was materially increased by pollination with good pollinators such as Morchione, and several popular secondary varieties whose actual yielding capacity is low were found to belong to this class of good pollinators for the main varieties. It is further pointed out that several varieties which are morphologically hard to distinguish from each other are cross compatible, though, each itself is self incompatible. The same was true of certain clones within varieties.

- 618 SPINA, P. & BÒTTARI, V.
Autofertilità e autosterilità delle varietà di olivo coltivate nella Sicilia settentrionale e centro-orientale e ricerca delle relative impollinatrici (Biennio 1950-51). [**Self fertility and self sterility of the varieties of olive grown in northern and in east-central Sicily and search for suitable pollinators (Two-year period 1950-51)**].
Ann. Sper. Agr. 1953 : 7 : 915-35.

These results of further pollination studies (cf. *PBA*, Vol. XXI, Abst. 2991 and Vol. XXIII, Abst. 664) indicate the self fertile, the cross fertile and the self sterile or practically self sterile varieties.

The most suitable pollinators for certain varieties are also mentioned.

- 619 CALVINO, G. E. M.
Osservazioni sul polline dell'olivo e altri temi di studio. (**Observations on olive pollen and other subjects of study**).
Ann. Sper. Agr. 1953 : 7 : 853-62.

The observations recorded deal with the morphology, germination capacity and vitality

of olive pollen and with the proper technique for determining the shape and size of the pollen grains.

The olive does not appear to be exclusively anemophilous, and may be partly entomophilous.

- 620 MORETTINI, A. & PULSELLI, A.
L'azione del vento nel trasporto del polline dell'olivo. (**The action of wind in carrying olive pollen**).
Ann. Sper. Agr. 1953 : 7 : 1187-218.

The variety Caninese has proved self sterile but nevertheless pure or almost pure plantations of it bear fruit fairly regularly. The same applied to the male-sterile variety Cerasola. Observations made specially for the purpose have confirmed the findings of previous investigators that olive flowers are not visited by bees.

Flowers bagged with gauze still set fruit and it is concluded that wind is the chief pollinating agent in cultivated olives. A certain proportion of plants of the variety Caninese show morphological deviations from the type and may represent distinct clones; nevertheless pollen from these clones also failed to effect fertilization when applied to normal type trees.

Slides smeared with lanolin revealed the presence of olive pollen at distances of 12 km. and more from the nearest olive plantation. Nevertheless it is considered likely that better and more regular yields will be obtained if suitable pollinating varieties are present within or near the plantation.

- 621 SPINA, P.
Le caratteristiche del polline nella classificazione delle razze di olivo. (**Pollen characteristics in the classification of varieties of olive**).
Ann. Sper. Agr. 1953 : 7 : 1003-13.

From his morphological and biometrical observations on olive pollen in central Italy, the writer finds such data inadequate as a basis for distinguishing varieties.

- 622 FRANCESCONI, F.
Sulla classificazione delle varietà di olivo. (**On the classification of olive varieties**).
Ann. Sper. Agr. 1953 : 7 : 711-37.

A statistical analysis has shown that the biometric indices relating to leaves, drupes, stones and seeds of olive varieties in Perugia cannot provide the basis for an exact varietal classification.

- 623 BOTTARI, V. & SPINA, P.
Le varietà di olivo coltivate in Sicilia.
Parti I-III. (**The varieties of olive
cultivated in Sicily. Parts I-III**).
Ann. Sper. Agr. 1953 : 7 : 937-78;
1141-74; 1421-44.

The need for identifying and classifying the olives grown in Sicily is pointed out and the methods and criteria used in the present study are enumerated. Information on synonyms, homonyms and area and extent of the different varieties is given, as well as their botanical and agronomic characteristics.

In part II descriptions of a number of less common varieties are presented, and in part III those of some recently introduced varieties.

- 624 MORT, C. H.
Olive varieties.
Agric. Gaz. N.S.W. 1953 : 64 : 227-28,
257-58.

Descriptions are given of varieties that have shown the best results as pickling, dual purpose or oil types in trials at the Wagga Agricultural College and Experiment Station, NSW. Notes on many other varieties under trial are also provided.

- 625 STOREY, W. B.
Genetics of the papaya.
J. Hered. 1953 : 44 : 70-78.

This survey of work on the inheritance of numerous qualitative and quantitative characters refers particularly to sex determination. Recent studies at the Hawaii Agricultural Experiment Station indicate that sex depends on a complex of genes, lying closely linked in differential segments of the sex chromosomes, rather than on three alleles (M_1 , M_2 and m) of a single gene, as was previously supposed (cf. *PBA*, Vol. XIII, Abst. 601). The complex comprises Mp , determining the long branching inflorescence of the male, the zygotic lethal l , the andrecium suppressor sa , the gynecium suppressor sg , and C , a hypothetical factor suppressing crossing over between sex differentials. Thus the apparently pleiotropic effects of M alleles can be attributed to the gene complexes being inherited as if they were unit factors. Hypothetical genotypes are presented for male (M_1m), hermaphrodite (M_2m) and female (mm), assuming that $Mp\ l\ C + sg$ corresponds to M_1 , $+ l\ C + sg$ to M_2 , and $+++ sa +$ to m . There are, however, two independent sets of factors, each consisting of several pairs of genes, modifying sex expression in males and hermaphrodites under certain environmental conditions. One set causes seasonal changes

as between female fertility and female sterility; the other induces carpellody of stamens. These modifying factors may also be transmitted by females.

Meiotic analyses in pollen mother cells of male and hermaphrodite trees have demonstrated the precocious separation of a single pair of chromosomes at anaphase I (cf. *PBA*, Vol. XVII, Abst. 72); it is not certain whether this represents a differentiation between autosomes and sex chromosomes.

- 626 **California Avocado Society 1952 Yearbook** : Pp. 255.

Report of the Avocado Variety Committee.
(pp. 17-19).

Avocado varieties recommended for different areas in California are listed.

Avocado varieties registered in 1952.
(pp. 21-22).

Brief descriptions are given of the five varieties registered: Alice, Dorene, Payan, Silliman and Susan.

Report of the Committee on Foreign Exploration. (pp. 25-26).

A new series of expeditions to collect material resistant to root rot (*Phytophthora cinnamomi*), for avocado rootstocks, is planned.

Schroeder, C. A. Avocado Exploration in Mexico—May, 1952. (pp. 27-30).

The seed samples collected, and now growing under observation in California, included *Persea schiedeana* and two possibly new species.

Miller, W. W. Expedition to Mexico. (Monterrey-Ciudad Victoria. Area).
(pp. 31-34).

Avocados with cold resistance and other useful characters were collected.

Report of the Subtropical Fruit Varieties Committee. (pp. 37-39).

The following recently registered varieties are briefly described: the carissas Frank and Serena; the macadamias Hall and Santa Ana; the sapotes Trowbridge, Max Golden and Coleman; the carobs Santa Fe, Nichols and Bolser; and the cherimoyas Whaley and Booth.

Report of the Avocado Research Committee.
(pp. 51-55).

Breeding and other projects recommended are listed.

Zentmyer G. A. Collecting avocados in Central America for disease resistance tests. (pp. 107-11).

In 1952 a visit was made to Honduras, Costa Rica, El Salvador, Guatemala and Mexico to

collect avocado types and related species resistant to root rot.

Halma, F. F. & Frolich, E. F. *An approach to the evaluation of avocado rootstock variability*. (pp. 154-58).

A method of producing a limited number of cuttings from very young seedlings is described. It is considered to be valuable in studying the range of variability among seedlings used as stocks, and in testing relative susceptibility to disease.

Halma, F. F. & Goodall, G. E. *Relative susceptibility of avocado rootstocks to chlorosis*. (pp. 172-76).

The chlorosis in question is probably due mainly to an excess of Ca. Young trees on Guatemalan rootstocks have again shown more chlorosis than those on Mexican varieties. Variations in susceptibility among seedlings of a single variety are possibly genetic.

Bringhurst, R. S. *Sexual reproduction in the avocado*. (pp. 210-14).

Dichogamy and the double opening of the flowers are discussed. The flowers are regarded as functionally monosexual, although structurally bisexual. Double opening is a cyclic phenomenon, variation in the cycle being associated with temperature fluctuations. There is no evidence that the cyclic behaviour of flower opening significantly influences fruit set. The importance of the factors of cyclic dichogamy and variations with temperature in controlled pollination is briefly considered.

627 JINNO, T.

(Chromosomes in *Rubus*. II).

Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 133-35. [Japanese].

Figures and brief descriptions are given of the metaphase chromosomes of *R. illecebrosus*, *R. wrightii*, *R. phoenicolasius*, *R. palmatoides*, *R. commersonii*, *R. ribifolius*, *R. faurieri* and *R. trifidus* (all $2n = 14$), and of *R. hakonensis* and *R. pseudosieboldii* ($2n = 56$).

628 JOHANSSON, E.

Om hallon och björnbär i USA, odling och växtförädling. (On raspberry and blackberry cultivation and breeding in the USA).

Sverig. Pomol. Fören. Årsskr. 1952 : 93-99.

This report of a study tour reviews briefly achievements in breeding small fruits at various institutes in nine states of the USA.

629 New thornless raspberry.

Amer. Nurserym. 1953 : 98 : No. 4 : p. 56.

The thornless red raspberry Canby, developed at the Oregon Agricultural Experiment Station, has midseason maturity and is superior to other commercial varieties of the Pacific Northwest in ability to retain colour, firmness and texture in storage and freezing.

630 KUMINOV, E.

(New varieties of raspberry).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 8 : p. 67. [Russian].

Sladkaja [Sweet] and Zorjka [Little Dawn], which are productive and hardy under the conditions of Krasnojarsk, are described briefly. Sladkaja was grown from seed of open-pollinated Usanka [Moustache]. The fruits are sweet and weigh 1.62 g. each. Zorjka was derived by the same method from Marlborough. It is more productive than Sladkaja and its fruits are larger. However, the flavour of Zorjka is indifferent when eaten fresh, although it makes good jam.

631 VAARAMA, A.

The effect of aneuploidy upon the progeny of an autotetraploid *Ribes nigrum*.

Maataloust. Aikakausk. 1953 : 25 : 77-83.

Investigations were carried out on the C_2 progeny of a colchicine-induced tetraploid with $2n = 32$ (cf. *PBA*, Vol. XXII, Abst. 2992). The frequencies of the C_2 individuals belonging to the different chromosome classes indicated a strong elimination of hypoploid zygotes. The effect of aneuploidy was slight, only involving some developmental processes apparently under polygenic control. Hypoploidy ($2n = 31$) had a less pronounced influence than hyperploidy ($2n = 33, 34$), the effect of two extra chromosomes being greater than that of only one. The hyperploidies tended to be retarded in growth rate and in onset of flowering, and to show abnormally long or short periods of growth. The monosomics equalled or exceeded the tetraploids in vigour, and may therefore be of practical value.

632 N., F.

Krusvinbär, en intressant nyhet. (The gooseberry-currant, an interesting novelty).

Svensk JordbrForsk. 1953 : p. 101.

A fertile, tetraploid hybrid of the gooseberry with the black currant has been bred at Alnarp, Sweden. It is called *Ribes nigrolaria* and has smooth, black fruits, larger than blackcurrants

and apparently not usually attacked by mildew, even when the tips of shoots are affected, as in 1953, when conditions favoured the development of the fungus. The number of seeds per fruit is low and reproduction is carried out by cuttings.

- 633 KRONENBERG, H. G.
Veredeling van kleinfruit in de verenigde staten van Amerika (3). [**Small fruit breeding in the USA (3)**].
Meded. Dir. Tuinb. 1953 : 16 : 253-65.

This concluding section of the review, already noted in *PBA*, Vol. XXIII, Abst. 2191, deals with blueberry and cranberry breeding.

- 634 MEDVEDEVA, O. A.
(**Strawberry varieties for the Leningrad province**).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 7 : 11-13. [Russian].

New varieties tested at Leningrad included Leningradskaja Pozdnjaja [Late Leningrad], interesting for its flavour, and Novinka [Novelty], for its large fruits and high sugar content.

- 635 LARSSON, G.
Jordgubbsförsök i Norrbotten 1947-52.
(**Strawberry trials in Norrbotten 1947-52**).
Sverig. Pomol. Fören. Årsskr. 1952 : 45-51.

In these trials, which were conducted at Öjebyn and Pållem, the variety Abundance from Alnarp gave a very high yield, but it was a week later than Abundance from Bergsjö. A new unnamed variety tested at Pållem showed great promise as regards hardiness and yield. The best dessert variety was Indra (cf. *PBA*, Vol. XXI, Abst. 2139).

- 636 HARLAMOV, V. P.
(**A new strawberry variety**).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 8 : 66-67. [Russian].

Krasnorečenskaja Rannjaja [Early Krasnorečensk] was selected from material grown from the seed of Roščinskaja at the Krasnorečensk State Farm, Habarovsk province. It is hardy and early and yields 43.16 c. per ha. It has perfect flowers and the flavour of the fruit is good.

- 637 HICKMAN, C. J. & GOODE, P. M.
A new method of testing the pathogenicity of *Phytophthora fragariae*.
Nature, Lond. 1953 : 172 : 211-12.

A new method providing a more severe test and shortening the experimental period to 12 days

instead of 7 weeks is described (cf. *PBA*, Vol. XXII, Abst. 714). It involves mass inoculation of strawberry roots by immersing them for approximately 24 hours in an active zoospore suspension. The runners are then planted five to a single pot, instead of one, as in the former method.

- 638 SPANGELO, L. P. S. & BOLTON, A. T.
Suggested infection scales for roguing strawberry seedlings susceptible to *Mycosphaerella fragariae* and *Diplocarpon earliana*.

Phytopathology 1953 : 43 : 345-47.

At the Central Experimental Farm, Ottawa, Ont., six infection classes have been photographically defined for each disease to standardize and facilitate the selection of desirable seedlings for breeding.

- 639 KRONENBERG, H. G.
Ervaringen met aardbeirassen in 1953.
(**Experience with strawberry varieties in 1953**).
Fruittelt 1953 : 43 : 618-20.

A study of strawberry varieties grown in the Netherlands has been carried out by a committee appointed by the horticultural marketing bodies in the country. Its provisional findings are set out. Macherauch's Frühernte [Macherauch's Early Harvest] receives favourable mention among the newer varieties.

- 640 ZUBIETJAN, P. A.
(**A Transcaucasian scientific conference on wine making and viticulture**).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1953 : No. 6 : 56-58. [Russian].

Breeding vines for hardiness and resistance to *Phylloxera* was referred to. Mention was made of some new varieties, developed in Azerbaïdžan, having perfect flowers. They surpass the standard Tavkveri in grape quality and yield. Other new varieties showed resistance to drought and *Phylloxera*. In Armenia, many active new strains of *Saccharomyces ellipsoideus* have been developed in recent years. They are described as active and ferment wines of the sherry type.

- 641 DOHNAL, T.
Některé poznatky z maďarského vinohradnictví. (**Some notes on Hungarian viticulture**).
Za Social. Zeměd. 1953 : 3 : 980-86.

New dessert varieties of grapes bred at Kecskemét, Hungary, include Iršai and Ida, which reach maturity in August.

- 642 SOLDATOV, P. K.
(Using **Kišmiš Černyi** as a dessert variety).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 7 : 42-44. [Russian].

The cultivation of the Uzbek variety **Kišmiš Černyi** [Black Sultana], interesting for its earliness and other good economic properties, in southern districts of the USSR, where there is a shortage of dessert varieties, is advocated.

- 643 COSMO, I. & COMUZZI, A.
Gli ibridi produttori diretti a Conegliano. (The hybrid direct producers at Conegliano).
Ann. Sper. Agr. 1953 : 7 : 1019-57, 1445-84.

The results of continued observations (cf. *PBA*, Vol. XVIII, Abst. 1222 and Vol. XXII, Abst. 2250) show nine out of 130 further hybrids studied to be worthy of consideration, being possessed of suitable combinations of vigour, fruit production, resistance to cryptogamic pathogens, quality and flavour of fruit and quality of the wine produced. Three of them are early varieties suitable for relatively cool areas. Full descriptions are given of the varieties studied.

The second part gives descriptions of a large number of Seibel forms and of the wine produced from them. Some are adjudicated as first class.

- 644 CECCARELLI, G.
Il primo vino di un diibrido di seconda generazione mendeliana. (The first wine from a dihybrid of the second Mendelian generation).
Riv. Vitic. 1953 : 6 : 173-75.

The grapes from five plants of a second-generation hybrid from the cross Negro amaro x complex hybrid 132-11 were subjected to a thorough study at the Stazione Sperimentale di Viticoltura e di Enologia [Experimental Station for Viticulture and Wine Making] at Conegliano in North Italy and the results are presented. The wine produced from them was almost identical with that from the European parent, Negro amaro [Bitter Negro], although the vine itself still showed marked resemblances to the complex American hybrid.

- 645 KOROBEV, P. V.
(Šabaš Krupnojagodnyi).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1953 : No. 6 : 38-40. [Russian].

A bud mutation of the Crimean vine variety Šabaš is described. The new form, designated

Šabaš Krupnojagodnyi [Large Grape Šabaš] produces more and larger grapes than the initial variety and the grapes contain fewer seeds.

- 646 BREIDER, H.
Les mutations somatiques de la vigne et leurs relations avec la structure des rameaux. (Somatic mutations in the grape vine and their relation to the structure of the branches).
Progr. Agric. Vitic. 1953 : 70 : 43-47; 70-73.

In investigations of 200,000 vines propagated vegetatively, it was found that, contrary to previously held views, black and red grapes are most liable to produce mutations in pigmentation. Mutations in the pigmentation of the leaf are independent of those in the grape. In both cases a certain symmetry was often observed, mutant leaves or bunches alternating with nonmutants on the same stem. Symmetry was also found among the individual clusters of a partly mutated bunch, indicating a fixed pattern in the inflorescence. In one instance bunches containing a small percentage of mutant grapes alternated with bunches having a higher proportion.

Both in leaf and grape the mutations would appear to originate in the first cells of the primordium. These investigations show that somatic mutations follow the same general laws as mutations arising in the sexual cells.

- 647 BREIDER, H.
Entwicklungsgeschichtlich-genetische Studien über somatische Mutationen bei der Rebe. (Studies on the developmental genetics of somatic mutations in the grape vine).
Züchter 1953 : 23 : 208-22.

The significance of mutations, both major and minor, in the grape vine is stressed, and the importance of unceasing vigilance, if purity of stock is to be retained, is emphasized.

Continual vegetative propagation favours the accumulation of mutations because germinal and zygotic selection is eliminated. The accumulation of minor mutations equals in its final effect a major mutation, and, in addition, the accumulation of unobserved minor mutations renders the appearance of major somatic mutations more frequent.

In the author's view, an inspection of sectorial chimeras justifies his theory of a monopodial construction of the vine shoot and leads to the rejection of the current belief that the vine shoot represents a sympodium.

The rhythmical distribution of many types of mutation (cf. Abst. 646) is then discussed, and examples are given.

648 LEBEDEV, L. JA.

(The cultivation of Amur vines).

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1953 : No. 6 : 30-36. [Russian].

Some wild forms of *Vitis amurensis*, interesting for their yield, earliness and high sugar content, have been selected at the Far Eastern research station of the Institute of Plant Industry.

649 TAKUSAGAWA, H.

Chromosome numbers of the Vitaceae.

Idengaku Zasshi/Jap. J. Genet. 1952 : 27 : 22-24.

Varieties of *V. riparia*, *V. rupestris*, *V. vinifera*, *V. labrusca*, *V. labrusca* x *V. vulpina*, *V. riparia* x *V. rupestris*, *V. champini* x *V. labrusca*, *V. lincecumii* x *V. bourquiniana*, *V. lincecumii* x *V. rupestris*, *V. lincecumii* x *V. labrusca*, *V. riparia* x *V. labrusca* and *V. labrusca* x *V. vinifera* were all found to possess a meiotic chromosome number of $n = 19$.

650 PONCE, J. R. & ZULUAGA, P. A.

Claves para un fácil reconocimiento de vides porta-injertos americanos más comunes en nuestra provincia. (**Keys for easy recognition of the American vine rootstocks most common in our province**).

Bol. Ext. Fac. Cienc. Agrar. Univ. Cuyo 1952 : No. 2 : Pp. 28.

Simplified ampelographic descriptions are given of a number of American *Vitis* species and hybrids used as rootstocks in the Mendoza province of Argentina. Indications are given of how the characters of the parental species are inherited in the F_1 hybrids and keys for the determination of the varieties are presented.

651 UNCKRICH.

Einfluss der Witterung auf den Ertrag verschiedener Rebsorten. (**The influence of weather conditions on the yield of different varieties of grape**).

Landw. Jb. Bayern 1953 : 30 : 463-501.

An attempt was made to determine the influence of climatic factors on the yield of different varieties of grape. Riesling and Silvaner were the most sensitive to adverse weather conditions, especially during the flowering period. Portugieser proved to be the variety most resistant

to cold and damp. Müller-Thurgau and Traminer occupied intermediate positions. In all varieties, and especially Portugieser, the amount of light received was found to exercise a greater effect than the temperature.

FORESTRY

652 **Report on Forest Research for the year ending March, 1952.**

Forestry Commission, London 1953 : Pp. 130.

Edwards, M. V. & Pinchin, R. D. *Provenance studies*. (pp. 43-57).

A summary of results obtained at the end of the fifth season of the international European larch provenance experiments in Britain (cf. *PBA* Vol. XXII, Abst. 746) includes tabulated data on height of larches of various provenance, and analyses of rate of growth with respect to altitude of original provenance, earliness of flushing and leaf fall.

At Knapdale, Argyll, and Drummond Hill and Strathyre, Perthshire, no consistent differences with respect to growth rate, tendency to lean and susceptibility to canker were found between Japanese larches grown from seed collected in 14 localities in Nagano Province, Honshu, Japan.

Strains of pine from coastal parts of Norway are being compared with local strains for resistance to wind on the western coast of Scotland. Data from older trials in Morayshire confirm the superior growth of indigenous strains compared with races from Finland, Georgia and Spain. Provenance trials of *Pinus contorta*, Corsican pine and Douglas fir are also reported.

Matthews, J. D. *Forest genetics*. (pp. 63-72).

A survey of seed stands in eastern Scotland was completed. Techniques for producing clones to be used in large-scale trials are being studied at Grizedale, Lancashire; a successful method has already been developed for Corsican pine, and clonal trials have begun at Alice Holt, Surrey. Studies on flowering, crossing and fruit production continued, particular attention being given to seed production in beech, pine and Corsican pine.

The progress of selection of plus trees and trials of beech, larch, pine and Sitka spruce are reported.

Jobling, J. *Establishment of poplars*. (pp. 72-75).

During this assessment it was noted that *Populus gelrica* and a narrow-crowned variety

of *P. serotina* were more likely to survive the first growing season at three centres in Norfolk and Surrey than the normal-crowned *P. serotina* or *P. robusta*.

Laing, E. V. *Morphological variations in coniferous species.* (pp. 120-21).

The four main lines of research are (1) the identification of hybrid larch at the seedling stage (cf. *PBA*, Vol. XXIII, Abst. 1485); (2) variations of cone structure in Japanese larch; (3) identification of races of European larch by means of cone and seed; and (4) anatomical and morphological distinction between *Pinus contorta* and *P. murrayana*.

653 The Forest Tree Breeding Station at Ruotsinkylä.

Helsinki 1952 : Pp. 4.

Breeding activities initiated at the recently established Forest Tree Breeding Station, Ruotsinkylä, Finland, are described. In addition to grafting and progeny tests connected with the development of seed plantations of plus trees, the work includes crossing between species or intraspecific hybridization involving parents from widely separated provenances, undertaken to exploit heterosis; hybridization between ordinary and triploid aspen; and study of "cut-leaved" birches, the progeny of triploid aspens and the selfed progeny of *Betula pubescens*. Seedlings from crosses between *Populus tremula* and *P. tremuloides* have so far shown very rapid growth and resistance to *Melampsora pinitorqua* and *Venturia tremulae*.

654 JOHNSON, H.

Årsberättelse över Föreningens för växtförädling av skogsträd verksamhet under år 1952. (*Annual report on the work of the Association for Forest Tree Breeding during 1952*). Årsberätt. För. Växtf. Skogstr. 1952 : 5-20.

Ekebo Station

Progeny trials of southern Swedish pine seedlings of different provenance have been laid out. Three series of experiments on pine clones have been planned in different localities in order to assess the influence of heredity or soil and climate on the development of the pine. Pollen distribution was investigated in plantings of grafted pine with a view to determining the requisite spacing between seed plantations. Clone trials of continent spruce, Swedish spruce and larch will provide a basis for a study of the various genotypes.

Grafted spruce and pine, raised on a large scale, included some tetraploids obtained by colchicine treatment.

The possibility of crossing Swedish pine with other species and the practical value of any fast-growing hybrids obtained from certain combinations were investigated by crossing *Pinus sylvestris* with the following as pollinators: the Japanese species *P. thunbergii* and *P. densiflora*; the North American species, *P. murrayana*, *P. banksiana* and *P. resinosa*; the European species, *P. nigra* and *P. mugo*; and the Indian species *P. roxburghii*. These crosses should also help to elucidate interspecific relationships. Larch crosses were also made.

Using a new technique, chromosome number determinations of morphologically aberrant seedlings of spruce were begun and some new tetraploids were thus discovered.

Shoot development and resistance to spring frosts (cf. Abst. 667) were also investigated.

Extensive progeny trials of hybrid aspen, species of birch, poplar, alder and oak are in progress. Poplar crosses, made in the greenhouse, included *Populus tremula* x *P. tremuloides* and hybrids between poplars from the coast of Ångermanland, where individual trees have been found whose progeny seem adapted to the "neutral-day" conditions of southern Sweden and might therefore be used to breed high quality aspens for that region.

Interspecific crosses of alder were made to obtain polyploid hybrids.

From *Fraxinus excelsior* x *F. americana* it is hoped to obtain hybrid seed that will germinate without a dormant period.

Brunsberg Station

The work of the station has included: progeny trials of pine, spruce, larch and aspen; the raising of 15,000 hybrid aspens from greenhouse crosses; artificial pollinations of selected pines, including grafted trees, and of birch, larch and spruce; and registration of nearly 100 plus trees in the course of the regional survey in Kopperberg province.

Sundmo Station

In addition to extensive grafting operations with pine, spruce, birch and poplar, the new so-called bud graft method, by which more grafts are obtained by using very small shoots as scions, was successfully applied on a small scale. Hybridization of pine included crosses of *P. sylvestris* with *P. thunbergii*, *P. densiflora* and the Chinese species *P. tabulaeformis*.

Selection of plus trees in Jämtland was carried out as part of the regular regional survey.

- 655 SIMAK, M. & GUSTAFSSON, Å.
X-ray photography and sensitivity in forest tree species.

Hereditas, Lund 1953 : 39 : 458-68.

An account is given of experiments on the X-ray photography of seed of *Alnus*, *Pinus*, *Picea*, *Larix* and *Thuja*, carried out with a view to devising a technique for seed testing in genetical work and forestry. The sensitivity of seeds of *Pinus sylvestris*, *Picea abies* and *A. glutinosa* to various doses of X rays was also studied. Specific differences in sensitivity were shown, alder seeds being the least and spruce seeds the most sensitive. The dose produced by exposure to X irradiation during photographing has not yet been definitely measured, but it lies below the lethal dose (600-1000 r.) for pine and spruce. It may however induce a very low percentage of lethal recessives and chromosome rearrangements; reduction in dose is therefore being sought by technical improvements.

- 656 JOHNSSON, H.
Hybridaspens ungdomsutveckling och ett försök till framtidsprognos. (**Juvenile development of the hybrid aspen and an attempt to assess its future**). Årsberätt. För. Växtf. Skogstr. 1952 : 21-44.

The content of this paper has already been reviewed from another source (cf. *PBA*, Vol. XXIII, Abst. 2996).

- 657 SCHLENKER, G.
Beobachtungen über die Geschlechtsverhältnisse bei jungen Graupappeln und Aspen. (**Observations on the sex ratio in young white poplar and aspen**). Z. Forstgen. Forstpflanzenz. 1953 : 2 : 102-04.

The F_1 progeny of crosses between *Populus tremula* and *P. alba* showed a considerable proportion of both partial and strongly developed hermaphrodite plants. This is thought to indicate primitive bisexuality in the section *Leuce*.

- 658 FENAROLI, L.
Note su l'ecologia e la distribuzione dei pioppi in Italia. (**Notes on the ecology and distribution of poplars in Italy**). Ann. Sper. Agr. 1953 : Supplement : 7 : I-XXXVI.

Data are presented on the geographical distribution of the poplar species indigenous to Italy and of their varieties and forms, based on an

extensive study of the literature. Some general indications are given of the ecological characteristics of the principal species.

- 659 V.D. ENDE, G.
Verslag van het onderzoek naar de populierenkanker in 1950 en 1951. (**Report of the investigation on canker of poplars in 1950 and 1951**). Meded. Ned. Heidemaatsch. 1953 : No. 16 : Pp. 19.

Progress is reported (cf. *PBA*, Vol. XXI, Abst. 3039) in research in the Netherlands on the resistance of *Populus* species and hybrids to bacterial canker. Extensive tables show the susceptibility or resistance of species and varieties to inoculations with (1) natural slime and (2) pure cultures of bacteria from branches of *P. tremula* var. *gigas* affected by die-back.

- 660 TELLERUP, E. & SCHAFFALITZKY DE MUCKADELL, M.
Individual differences in the shape of wood rays in *Fagus sylvatica* L. Årsskr. K. Vet.-og Landbhøjsk. 1953 : 147-57.

Clonal differentiation in respect of the shape of wood rays, as seen in tangential section, has been observed at the Hørsholm Arboretum, Denmark. An examination of variation in natural populations from different parts of Denmark is therefore desirable.

- 661 EHRENBURG, C. E.
Studies on elm pollen. Bot. Notiser 1953 : No. 3 : 308-16.

A study was undertaken of the pollen of *Ulmus glabra* from Sweden and elsewhere, and the relative fertility and diameter of different samples were analysed. Varying degrees of partial sterility occurred in 47.2% of cases, this sterility, together with considerable variation in diameter of pollen, being genetically determined. Pollen of two of the three asynaptic trees investigated was only 10-20% fertile, this being attributed to autotriploidy. The frequent occurrence of large grains of pollen among normal pollen in many samples suggests that unreduced pollen grains are formed spontaneously in the elm.

- 662 Verslag over 1951. (**Report for 1951**). Meded. Inst. Toegepast Biol. Onderz. Nat. 1952 : No. 13 : Pp. 50.

Elm. The variety Bea Schwarz is resistant to elm disease. Other resistant forms, though not greatly valued in the Netherlands, have been

crossed with superior varieties in the hope of combining resistance with quality. Promising resistant seedling material includes *Ulmus carpinifolia* 62 and the hybrids 260 (*U. pumila pinnata ramosa* x *U. hollandica vegeta*), 148 (a cross of *U. hollandica* with *U. carpinifolia* 28), and 248 (*U. wallichiana* x *U. carpinifolia* 1). Both 148 and 248 have shown slight indications of susceptibility to *Nectria cinnabarina*.

Bramble. In addition to a collection of 20 cultivated races, a botanical collection of about 90 forms has now been assembled and chromosome numbers have been determined.

Other plants. Chromosome determinations of *Amelanchier laevis* f. *villosa* and other species were carried out. Crosses between diploid and tetraploid species have been made.

663 Verslag over het jaar 1952. (**Report for the year 1952**).

Meded. Inst. Toegepast Biol. Onderz. Nat. 1953 : No. 14 : Pp. 33.

Previous findings regarding the superior resistance of seedlings from selected trees to elm disease were borne out, especially in the case of Bea Schwarz (*Ulmus carpinifolia* 62) and its hybrid with *U. carpinifolia* 1. Similarly, improved resistance was noted in various selected hybrids from intraspecific and interspecific crosses.

Self pollination of elms yielded 34 seedlings, as compared with 3743 from hybridization. Selfing of *U. carpinifolia* over a period of 15 years gave between 0 and 14.8% fertile seeds. Emasculation of *U. hollandica* had a favourable effect on the set.

The possibility of identifying viable seed by its reaction to a solution of triphenyltetrazolium chloride was investigated.

The number of fertile seeds produced from crosses depends largely on the species. Some species produce a greater amount of fertile seed when used as the pistillate parent, and others when used as the pollinator.

The shape and dimensions of the leaves of the 1951 seedlings were recorded. Some hybrids had leaves of the *glabra* type, owing to the occurrence of *U. glabra* in the ancestry of one of the parents.

This year's unexpected results of tests of the resistance of Bea Schwarz and various interspecific hybrids to *Nectria cinnabarina* suggest the need for some better technique of inoculation.

Some diploid, triploid and tetraploid forms of *U. glabra* from Sweden proved too susceptible to elm disease for use in hybridization work.

664 SCHRÖCK, O.

Beitrag zur Züchtung der Robinie (*Robinia pseudacacia*). [A contribution to the breeding of *Robinia* (*R. pseudacacia*)].

Züchter 1953 : 23 : 266-72.

A distinction is made between two forms of *Robinia*, the one having a smooth, and the other a coarse bark. Intermediate forms were taken to be hybrids. The smooth-barked variety shows the quickest growth, but the trunk is more inclined to be crooked.

One of the most important objects in growing *Robinia* is to obtain trees with straight trunks. This is a genetically determined characteristic, as is apparently also the quality of the wood itself. A careful breeding programme should remove difficulties at present in the way of large-scale cultivation of *Robinia* timber. It is considered that the commonly held view that it is susceptible to frost is greatly exaggerated.

665 TODD, M. A.

The types of *Eucalyptus paniculata* Sm. and *E. siderophloia* Benth. and their probable relationships.

Kew Bull. 1953 : No. 2 : 191-206.

Variability of anther and leaf characters in herbarium syntypes of *E. paniculata* and *E. siderophloia* kept at Kew, England, and Melbourne, Australia, suggests that both taxa represent hybrid complexes, probably linked with one another. An examination of these complexes occurring in Queensland and coastal districts of New South Wales is expected to reveal hybrid swarms derived from a wide range of parents.

666 HALL, N. & JOHNSTON, R. D.

The field identification of eucalypts.

Unasylva 1953 : 7 : 64, 68-69.

A card-sorting system for the identification of *Eucalyptus* species in the field is described in detail. The preliminary coding was based primarily upon Blakely's classification (1934) and was supplemented by examination of a large number of herbarium specimens in Australia, particularly in New South Wales.

667 KIELLANDER, C. L.

Kontinentgranen. (The Continent spruce).

Årsberätt. För. Växtf. Skogstr. 1952 : 45-62.

This lecture, delivered at the 1953 meeting of the Swedish Sylviculture Association, has

already been summarized (cf. *PBA*, Vol. XXIII, Abst. 3011).

668 ZOBEL, B. J.

Are there natural loblolly-shortleaf pine hybrids?

J. For. 1953 : 51 : 494-95.

During a survey of cone size in loblolly (*Pinus taeda*) and shortleaf (*P. echinata*) pines in eastern Texas, occasional individuals intermediate between the two species were found. These trees were also intermediate with respect to other morphological characters. Seedlings obtained from these trees resembled artificially produced interspecific hybrids. Differences in time of flowering have, until now, been considered sufficient to prevent natural hybridization between the species, but it is suggested that unusual weather may induce precocious pollen shedding in *P. echinata* while female flowers of *P. taeda* are still receptive. Until the limits of variability for each species are determined, however, it is not possible to decide whether the intermediacy may not merely be due to extensive variation within each species resulting in an overlapping of characters.

669 ZENKE, U.

Untersuchungen über den Ablauf der Meiosis bei *Pseudotsuga taxifolia* Britton. [Studies on the course of meiosis in *P. taxifolia* Britton].
Z. Forstgen. Forstpflanzenz. 1953 : 2 : 96-102.

The characteristics of the different stages are described and illustrated. It was confirmed that $2n = 26$. Chiasmata appeared to be extremely localized, and practically no terminalization occurred. This behaviour is thought to be characteristic of all the Pinaceae.

670 KIELLANDER, C. L.

Vad är "kontinentgranen" och "kontinenttallen"? (What are the "continent spruce" and the "continent pine")?
Skogen 1953 : 40 : 204-05.

Defending his proposed introduction of the above terms (cf. *PBA*, Vol. XXIII, Absts. 3009 and 3010), the writer redefines their use as follows; they refer to spruce or pine native to the European continent, except Scandinavia, Finland and Russia, and are intended to provide common designations for spruce or pine that has been imported or is to be imported into Sweden; they are to be used in contrast to Swedish spruce or pine.

VEGETABLES

671 **National Vegetable Research Station. The Station and its work—summer 1953.**

Seed Tr. Rev. 1953 : 5 : 215-23.

An account is given of the work of the Vegetable Research Station at Wellesbourne, England, and of its substation at Paglesham. The Plant Breeding Section has taken over the responsibility of maintaining supplies of nucleus stock seed of the Cambridge Horticultural Research Station varieties which have already been marketed. Work has been started on breeding new varieties of cabbage, lettuce, red beet and spring cabbage.

672 BYKOVSKIĬ, V.

(At the West Siberian Horticultural Research Station).

Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 8 : 56-57. [Russian].

Breeding of potatoes, onion and cabbage, besides the crops listed below, is in progress at Barnaul.

Carrot. Altaiskaja Ukoročennaja [Altai Short] was obtained by threefold selection of Chantenay. It yields 794 c. per ha. and produces stumpy roots, which may be harvested with a potato digger.

Tomato. Sibirskii Štambovyĭ [Siberian Determinate], from Štambovyĭ Alpatjeva [Alpatjev's Determinate] x Gruntovyĭ Skorospelyĭ [Outdoor Early] is an early and productive outdoor variety. Altaiskii Tepličnyi [Altai Greenhouse] was obtained by intravarietal cross pollination and selection of a land variety grown in the Altai territory. It outyields Lučšii iz Vseh [Best of All].

Pea. Altaiskii Štambovyĭ Saharnyi 61 [Altai Determinate Sugar Pea 61], from Saharnyi Mozgovoi 06 [Marrowfat Sugar Pea 06] x Štambovyĭ Luščilnyi [Determinate Pod Pea], yields more seed and green matter than the standard, its female parent, and shows resistance to lodging. The pods are bunched together high above the ground and can be harvested with a combine.

673 VLASOV, I.

(The questions of organizing horticulture in the suburban zones).

Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) 1953 : No. 8 : 3-28. [Russian].

Methods of improving the supply of fresh vegetables to industrial centres are discussed, with brief notes on some varieties improved or

bred in recent years at various Soviet institutes. **Beet.** Podzimnjaja [Late Autumn], bred at Gribovo, is a fortnight earlier than other varieties when sown in autumn.

Carrot. Zimnjaja Gribovskaja [Winter Gribovo], developed at Gribovo, and Nantes 14, bred at the Verhnehavskaja Research Station, are interesting for their high yield, earliness and good flavour.

Onion. Odnoletnii Havskii [Annual Havskii] and Odnoletnii Sibirskii [Annual Siberian], produce bulbs in one season under the conditions of the central Black-Earth Belt and western Siberia. Kaba, bred at Birjučii Kut, produces a high yield of bulbs free from the pungent flavour of other varieties and is adapted to many different climates. Varieties developed at Krasnodar include a shallot yielding 250–300 c. per ha., which is noted for its good transportability.

Cucurbits. Krupnoplodnaja 1 [Large-fruited 1], bred at the Bykovskaja Research Station, is a promising new pumpkin variety adapted to the climate of southeastern Russia. Mention is made of some productive interspecific hybrids still under trial. A high degree of heterosis was observed in the pumpkin hybrid Vitaminnaja [Vitamin] x Karotinnaja 102 [Carotene 102]. The new varieties of water melon, Bykovskii 48, Bykovskii 23 and Bykovskii 22, which are notable for their high yields, earliness and good flavour, have been released. Mention is made of heterosis observed in the water melon hybrid Melitopolj 143 x Belosemjačko [White Seed] and the melon hybrid Kolhoznicja [Collective Farmer] x Bykovskaja 735.

Cucumber. At Birjučii Kut, Hybrid 175, which outyields Rjabčik 357 [Partridge 357] and gives fruits of better flavour, has been developed. Other new varieties include Tretii List [Third Leaf], bred at the Far Eastern Research Station; it shows resistance to diseases and has good pickling properties.

674 Tuinbouwdagen 1952. Tekst van de voordrachten gehouden te Wageningen 16–18 April. (**Horticulture Meeting 1952. Text of addresses given at Wageningen 16–18 April**).

Meded. Dir. Tuinb. 1952 : 15 : 469–782. Kronenberg, H. G. Veredelingswerk met aardbeien op het Instituut voor de Veredeling van Tuinbouwgewassen. (*Breeding work with strawberries at the Institute for Horticultural Plant Breeding*). (pp. 522–35).

The lecturer outlined the special requirements which breeders in the Netherlands must meet as

regards quality and disease resistance. Test crosses between local and American varieties have proved promising, in contrast to crosses of Dutch with some other European varieties.

Blakemore, Brightmore and Temple showed no loss of vigour on selfing, but June yellows was evident in Blakemore as well as in Howard 17 and Madame Montot after selfing.

Preliminary genetic analyses of varieties of possible value as breeding material have been concerned with earliness, fertility of stamens, capping, and fruit quality.

Future research will be carried out on the selection of better parents for breeding, efficient methods of testing selections for quality, disease resistance and adaptation to strawberry growing localities in the Netherlands.

Possible ways of shortening the time needed to breed a new variety were mentioned in the ensuing discussion.

Doel en werkzaamheden van de Afdeling Resistentie-Onderzoek van het I.P.O. (Aim and activities of the Disease Resistance Research Department of the IPO). (pp. 758–72).

An account is given of the work of the above mentioned Department of the Institute of Phytopathological Research (IPO) at Wageningen in assisting plant breeders and institutes in the study of disease resistance. Particular problems encountered and the methods of attacking them are exemplified with reference to diseases of wheat, rye, clover, beet, potatoes, tomatoes, peas and beans (cf. *PBA*, Vol. XXIII, Abst. 1219).

675 Tuinbouwdagen 1953. Tekst van de voordrachten gehouden te Wageningen 8–10 April. (**Horticultural Meeting, 1953. Text of lectures delivered at Wageningen 8–10 April**).

Meded. Dir. Tuinb. 1953 : 16 : 437–670.

Wasscher, J. Hoe zijn de variëteiten van de bloemisterijgewassen ontstaan? (*How have the varieties of floricultural plants arisen?*). (pp. 473–86).

In considering the origin of new varieties of floricultural plants by hybridization and mutation, the speaker discussed intergeneric and interspecific crossing, hybrid vigour, disease resistance, gene mutation and chromosome aberrations, polyploidy and aneuploidy.

Termohlen, G. P. Het kweken op schurft-resistentie bij appel en peer. (*Breeding for scab resistance in apple and pear*). (pp. 519–32).

Limiting his remarks mainly to apple scab and

drawing largely on the results of English, American and German research, the speaker reviewed the position reached in breeding for scab resistance by hybridization between or within species or varieties of *Malus*. It is suggested that the causal fungus, *Venturia* sp., may be assumed to consist of a constant population composed of types differing in morphology and pathogenicity.

676 KITCHIN, J. T.

Vegetable comments.

N.J. Hort. Soc. News 1953 : 34 : 2685, 2696.

A survey of vegetable breeding carried out at the New Jersey Agricultural Experiment Station refers to the following:

Asparagus. The hybrid obtained from a cross between selected plants of strain 9418, bred at the station, has been designated 28.

Rhubarb. A new vigorous strain known as New Jersey 134 has been developed. It is on trial with seven standard varieties.

Lettuce. Among several promising numbered lines, 3977 has proved sufficiently outstanding to be released, after being named Jade. The new variety has crisp heads.

677 SAIDOV, D. I.

(Local varieties of vegetables in the Dagestan ASSR).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 38-39. [Russian].

Trials at Derbent, Dagestan, suggest that some land varieties of carrot, onion and egg plant are more productive and have better keeping properties and a higher degree of resistance to pests and diseases than the local standards. The onions Kajakent and Derbent also proved a fortnight earlier than the standard Kaba and the egg plant Derbent 5-7 days earlier than the standard Dlinnyĭ Fioletovyĭ 239 [Long Mauve 239].

678 ANDRUS, C. F.

Evaluation and use of disease resistance by vegetable breeders.

Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 434-46.

The writer stresses the necessity of keeping the question of breeding for disease resistance in balanced perspective with other objectives. Disease resistance is, in itself, worthless and must be combined with worthwhile agronomic characteristics and commercial acceptability, apart from exceptional cases in which the stock may possess outstanding breeding value. Resistance to as many diseases and pests as possible should be combined in the same plant.

The genetical limitations of resistance breeding are then pointed out. The reduction of all procedures and concepts to their simplest terms is advocated, and a uniform maximum rating system for all vegetable diseases proposed. Close cooperation between the plant breeder and the plant pathologist is essential.

679 WIJBRANS, J. R.

Voederwortelen. I. De indeling en de beschrijving van het in Nederland geteelde sortiment. (**Fodder carrots. I. The classification and description of varieties grown in the Netherlands**).

Euphytica, Wageningen 1953 : 2 : 149-56.

SCHUIJGROND, W.

Voederwortelen. II. De teelte, de waardebepalende hoedanigheden en enkele voor de veredeling belangrijke correlaties. (**Fodder carrots. II. Cultivation, quality and some correlations important in breeding**).

Ibid. 1953 : 2 : 157-60.

Fodder carrots are classified according to colour, length and shape of root. Dry-matter content is highest in conical deep-rooted forms, such as Wessemmer landras [Wessemmer land race] and Robra, and these forms are winter hardy and possess good keeping qualities. The carotene content of the root is highly correlated with its colour.

680 BERNSTEIN, L. & AYERS, A. D.

Salt tolerance of five varieties of carrots.

Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 360-66.

The effects of salt on the yields and quality of five varieties of carrots were studied. Danvers Half-long and Chantenay were slightly more tolerant of saline soils than the other varieties tested, and a positive correlation was noted between tolerance of salinity and the Ca/K ratio in the tops of the carrots.

681 BANGA, O. & KEULS, M.

Practijkproeven Berlikumer wortel 1949. (**Field tests of Berlikum carrots, 1949**).

Meded. Inst. Vered. TuinbGewass. 1953 : No. 47 : Pp. 15.

Particulars are given of yield, average weight, shape and colour, resistance to cracking, quality and relation between weight of foliage and root of 20 new strains of Berlikum carrot, together with the names of the selectors of the 10 strains approved by the adjudicative committee.

- 682 BANGA, O., KEULS, M. & WATTEL, M.
Praktijkproeven met Flakkeese winter-
wortel 1950-1951. (**Field tests of
Flakkee winter carrot, 1950-1951**).
Meded. Inst. Vered. TuinbGewass. 1953 :
No. 49 : Pp. 23.

Particulars are given of tests carried out on 33 new strains of Flakkee winter carrot, together with the names of the selectors of the 14 strains approved by the adjudicative committee. Data on yield, colour, commercial value, relationship between weight of foliage and weight of root, and harvest wastage due to root aberrations and attack by root fly are included.

- 683 HOSODA, T.
(**On the tendency to resemble the mother plant in respect of bolting in some first generation intervarietal hybrids of the radish**).
Idengaku Zasshi/Jap. J. Genet. 1950 :
25 : p. 243. (Abst.). [Japanese].

A fuller version of this paper has been summarized in *PBA*, Vol. XXIII, Abst. 3028.

- 684 POUND, G. S. & FOWLER, D. L.
Fusarium wilt of radish in Wisconsin.
Phytopathology 1953 : 43 : 277-80.

Fusarium isolates from the cabbage and radish have been designated races 1 and 2 of *Fusarium oxysporum* f. *conglutinans*, respectively. All the commercial varieties of radish tested at the Wisconsin Agricultural Experiment Station were susceptible to radish wilt under field and greenhouse conditions, but occasional plants remained free from infection. Resistant lines of the Scarlet Globe type have been developed by selection.

- 685 BANGA, O.
Praktijkproeven met ronde rode radijs
1951-1952. (**Field trials of round red
radishes, 1951-1952**).
Meded. Inst. Vered. TuinbGewass. 1953 :
No. 44 : Pp. 16.

Particulars are given of the tenderness and shape of root, and weight of foliage in relation to weight of root, of 54 varieties of radish.

- 686 KONONKOV, P. F.
(**The nature of segregation in the second generation of hybrid plants**).
Izvestija Akad. Nauk SSSR (News Acad.
Sci. USSR) Ser. Biol. 1953 : No. 2 :
89-98. [Russian].

At the Institute of Genetics of the USSR Academy of Sciences, the onion hybrids Bessonovskii x Savtftorskii Želtyi Šar [Savtforskii Yellow Globe], Arzamasskii x Ebenezer, Ebenezer x Arzamasskii and Mjačkovskii x Arzamasskii were induced to form aerial bulbils.

The progenies obtained from the bulbils gave analogous segregates in respect of parental characters to those of the F_2 sexual hybrids. It is concluded that segregation in the second generation of hybrid organisms is due to the development of heterogeneous somatic cells, from which, at a later stage, reproductive cells are formed. Cytological observations showed that the aerial bulbils were formed from living substance having no cellular structure. This was secreted by the initial cells of the inflorescences when the flowers were removed to induce the development of bulbils. The cells formed from the living substance are regarded as regenerated. Therefore, the progenies of aerial bulbils are considered as rejuvenated.

- 687 NODA, S.
(**A new onion caryotype containing three nucleolar chromosomes**).
Idengaku Zasshi/Jap. J. Genet. 1952 :
27 : 173-75. [Japanese].

Individuals of *Allium cepa* with 3 or 4 nucleolar chromosomes instead of the normal 2 have been discovered. It is suggested that the new types either arose by structural rearrangement or by a modification of the nucleolar-forming capacities of the chromosomes themselves.

- 688 HAMASHIMA, N.
(**On the maturation period of onion varieties**).
Engeigaku Kai Zasshi/J. Hort. Soc.
Japan 1953 : 22 : 33-40. [Japanese].

Data are provided on the maturation period and mature plant characteristics of a series of Japanese and American varieties grown under various conditions of temperature and photoperiod.

- 689 TUMANOVA, O. G.
(**Developing a winter onion**).
Sad i Ogorod (Fruit & Vegetable
Gardens) 1953 : No. 8 : 37-38. [Russian].

The variety Kusarcaiskii was obtained by training a spring form, selected from an Armenian population named Kaba Borispolje, for the winter habit. The winter variety reaches maturity in July, and is more productive and develops larger bulbs than the spring form.

- 690 KATO, Y.
Descriptive and experimental cytology in *Allium*. 1. The formation of micropollen grains, with some notes on spontaneous chromosome aberrations in *Allium odorum*.
Idengaku Zasshi/Jap. J. Genet. 1952 :
27 : 148-56.

Extranuclear Feulgen-positive chromatin bodies

were found throughout microsporogenesis in the cytoplasm of a number of specimens of *A. odorum*. The number of these bodies varies from one to seven per cell. They are circular and have an average diameter of 3.9 μ .

Premeiotic disturbances, involving the transfer of chromatin from nucleus to cytoplasm, are thought to give rise to these bodies, which do not divide or fuse and appear to act as an obstacle to the formation of normal pollen grains. Chromosome aberrations in *A. odorum* were observed. Breakage and nonpairing appear to be determined by separate mechanisms, and to be independent of each other.

691 KONONKOV, P. F.

(The question of obtaining garlic seed).

Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 8 : 38-40. [Russian].

At the Institute of Genetics, Moscow, the winter garlic 60, originating from Gribovo, was induced to develop inflorescences under laboratory conditions. Some viable seed was obtained as a result of intravarietal cross pollination.

692 USTINOVA, E. I.

(Anomalies in the structure of inflorescences and flowers of the onion).
Bot. Ž. (Bot. J.), Moskva 1953 : 38 : 142-45. [Russian].

Many onion species investigated at the Timirjazev Agricultural Academy showed various anomalies in the structure of their reproductive organs. These consisted of (1) proliferation of inflorescences, (2) fasciation of pedicels or flowers, (3) multiplication of floral organs, (4) development of unisexual flowers, and (5) production of bulbils in the place of flowers. Certain anomalies observed in some species, such as proliferation of inflorescences of *Allium senescens*, *A. glaucum*, *A. scorodoprasum*, *A. pskemense*, *A. sativum* and *A. cyaneum*, are replications of heritably fixed characters in others such as *A. proliferum*.

693 TUŠNJKOVA, M. M.

(Grafting in the Cruciferae).

Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952 : No. 19 : 152-63. [Russian].

A cabbage scion increased the size and changed the chemical composition of its radish stock. Analyses of the first seed generation from the stock showed that the chemical changes were heritable. Grafting experiments with other material, including radish on kohlrabi, suggested that the leaves of the scion exert a strong influence upon the accumulation of glycosides, which are regarded as responsible for the

resistance of some Cruciferae to club root. Grafting radish and other plants synthesizing glycosides on cabbage is advocated as a method of breeding for resistance to club root.

694 SNEEP, J.

The significance of andromonecy for the breeding of *Asparagus officinalis* L.

Euphytica, Wageningen 1953 : 2 : 89-95.

The possibility of breeding a strain of andromonoecious plants is discussed. These, when crossed with selected ♀ plants would give an F₁ generation of purely ♂ plants, resulting in higher yield, earliness and increased longevity.

695 POUND, G. S. & WALKER, J. C.

Autogenous necrosis of cabbage.

Phytopathology 1953 : 43 : 415-18.

Autogenous necrosis, a hitherto unreported disease of genetic origin found in certain inbred lines of cabbage, is described. Its manifestations, which comprise stunting and defoliation, appear to be controlled by three separate groups of genes, one causing leaf spotting, one scorching of the leaf, and the other severe necrosis of the base of the petioles. These gene systems all appear to be recessive.

696 MIHAĬLOVA, L. V.

(A broccoli arising in cabbage progeny).

Agrobiologija (Agrobiology) 1953 : No. 2 : 23-26. [Russian].

A supplementary report to previous investigations of conversion in the cabbage (cf. *PBA*, Vol. XXIII, Abst. 1537) is presented. In 1947, the progeny of a cabbage with shattered inheritance included a plant resembling cauliflower, besides rape forms and various other botanical varieties of *Brassica*. The cauliflower type produced some vigorous forage cabbages, when open-pollinated with the various other forms in the cabbage progeny. The material was then selected for good leaf production and intercrossed *inter se* and the seed of the following generation was used for trials under varying climatic conditions. The seed sown in Moscow gave mostly forage types of cabbage, but a single plant was identified as broccoli.

697 MATSUMURA, T.

(On seed production and degeneration in late-bolting strains of cabbages. An example drawn from the Hikoshima spring cabbage).

Engeigaku Kai Zasshi/J. Hort. Soc. Japan 1953 : 22 : 28-32. [Japanese].

Among the experiments reported with the above variety, strains were isolated characterized by

differences in time of bolting. On selfing or intercrossing these strains, it was discovered that early bolting was an hereditary character and that selfing had a deleterious effect on plant development.

- 698 KÖHNLEIN, J. & FENSE, H.
Leistungsvergleich der bekanntesten Markstammkohlzüchtungen. (**Comparative performance of the best known varieties of marrow-stem kale**).
Z. Acker- u. PflBau 1953 : 96 : 519-31.

Seven varieties of marrow-stem kale were tested over a three year period. Littmann grüner [Littmann Green] and Petersen grüner [Petersen Green] proved superior in yield and fodder value, and the green-leaved varieties in general were better than the blue or red-leaved forms.

- 699 PLAUT, M., LACHOVER, D. & COHEN-ASCOLI, B.
Experiments in chicory growing under Israel condition.
Mater. Veg. 1953 : 1 : 263-77.

Several varieties of chicory are compared as to root characteristics, yield and quality, and the possibility of selecting a variety adapted to local conditions is discussed.

- 700 POPE, D. T. & MUNGER, H. M.
The inheritance of susceptibility to boron deficiency in celery.
Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 481-86.

Susceptibility to boron deficiency is apparently due to a single recessive gene.

- 701 POPE, D. T. & MUNGER, H. M.
Heredity and nutrition in relation to magnesium deficiency chlorosis in celery.
Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 472-80.

Several celery varieties growing under conditions of magnesium scarcity were observed to develop chlorosis. Utilization of magnesium was shown to be conditioned by a single dominant gene.

- 702 MUNGER, H. M. & NEWHALL, A. G.
Breeding for disease resistance in celery and cucurbits.
Phytopathology 1953 : 43 : 254-59.

Breeding for disease resistance in celery and the cucurbits in the United States is discussed. In the case of celery, breeding for resistance to *Fusarium* yellows, early blight (*Cercospora apii*) and late blight (*Septoria apii-graveolentis*) is referred to. Breeding for resistance to the following diseases in the different cucurbits is surveyed: water melon, resistance to *Fusarium*

wilt and anthracnose; musk melon, resistance to powdery mildew, *Fusarium* wilt, downy mildew, *Alternaria* leaf spot, mosaic and stem streak (unidentified fungus); cucumber, resistance to mosaic, downy and powdery mildew, and scab; and *Cucurbita moschata* and *C. pepo*, resistance to mosaic.

- 703 RICK, C. M.
Hybridization between chicory and endive.
Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 459-66.

Hybridization between *Cichorium intybus* and *C. endivia* was studied. The former being self incompatible and the latter self fertile, almost all hybrids originated from the chicory plant, and the significance of this for plant breeders is discussed.

Apart from a heteromorphic bivalent and an inversion bridge, meiosis in the pollen mother cells of the F_1 was regular. Pollen and seed fertility and viability were considerably reduced. Segregation was studied in the F_2 population. The difference in flower colour is governed by a single gene, the blue of chicory being dominant over the mauve of endive; fasciation in endive appears to be conditioned by a major recessive gene; and the length of the peduncle may also be influenced by a single major gene. No barriers to gene segregation or recombination were observed.

- 704 DAVIS, G. N.
Golden Pershaw.
Calif. Agric. 1953 : 7 : No. 8 : p. 13.

A new winter melon, Golden Pershaw, originating from a chance hybrid of undetermined parentage, is described. The vines are large and vigorous, producing golden yellow fruits weighing from 8 to 10 pounds, which may be harvested over a 3 to 4 week period from one planting. The flesh is thick and sweet, and the seed cavity medium in size and dry.

- 705 FURUSATO, K. & TANAKA, M.
(Studies on artificially induced polyploids of the melon. I. The production of tetraploid melons by colchicine treatment).
Seiken Jiho/Rep. Kihara Inst. Biol. Res. 1952 : No. 5 : 100-05. [Japanese].

Tetraploid strains of five Japanese varieties were obtained by colchicine treatment. The tetraploids were larger than the diploids and also showed some morphological differences. A range of meiotic configurations was observed, the most frequent being $3_{IV} + 18_{II}$. Fertility was reduced but in one case reached a value of 70%.

- 706 FUROSATO, K. & MIYAZAWA, A.
(**Report on investigations on the
pollination of triploid water melons**).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 128-30. [Japanese].

Numerous pollinations were effected using various $3x$ strains as mother plants and various $2x$ and $4x$ varieties as pollinators. Significant differences in the frequency of empty seeds due to the variety of the mother plant or of the pollinator were not observed.

- 707 KOYAMA, M.
(**Studies on empty seeds in triploid
water melons. I.**).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 105-09. [Japanese].

Data are provided on the number of empty seeds resulting from hormone treatment only and from various combined treatments involving pollination and hormone application.

- 708 FURUSATO, K.
(**Some studies on polyploid water
melons**).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 125-28. [Japanese].

Graft combinations were effected with $2x$, $3x$ and $4x$ water melon scions on *Lagenaria vulgaris* stocks, $2x$ water melon scions on $3x$ or $4x$ water melon stocks, and $3x$ water melon scions on $2x$ water melon stocks. Improved fruit yields resulted from using *L. vulgaris* as a stock.

A mixed pollination experiment is also reported using a $4x$ water melon as the mother plant and mixed $2x$ and $4x$ pollen. This operation produced 91.7% and 8.3% $4x$ plants.

- 709 FURUSATO, K.
(**The production of a tetraploid strain
of the Kaho water melon by means
of colchicine treatment**).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 131-32. [Japanese].

A tetraploid strain of the variety Kaho [Precious Treasure] was obtained by the above technique. The fruits of the tetraploids were subspherical in contrast to the elongate fruits of the parental diploids.

- 710 NISHIYAMA, I., SHIMOTSUMA, M. & YABUNO, T.
(**A comparative study of the develop-
ment of polyploid seed in the water
melon**).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 110-18. [Japanese].

A comparative histological examination was made of seed development in the varieties Shinyamato [New Japanese] ($2x$), Yamato

[Japanese] ($4x$) and their $4x \times 2x$ F_1 hybrid. In the latter, a state of unbalance results from the differential development of the $4x$ testa and the $2x$ embryo, and subsequent germination is impeded.

- 711 NISHIDA, S.
(**Observations on the anatomy of the
testa in the water melon**).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 122-24. [Japanese].

A microscopic examination was made of $2x$, $3x$ and $4x$ strains. The $3x$ and $4x$ forms have thicker cell layers than the $2x$ and tend to crack under dry conditions, owing to collapse of the palisade parenchyma.

- 712 TKAČENKO, F. A.
(**The root systems of the hybrids and
varieties of water melon**).
Agrobiologija (Agrobiology) 1953 : No. 3 :
156-59. [Russian].

The F_1 hybrids of Skorospelka Skvirskaja [Early Skvir] $\times$ Ljubimec Hutora Pjatigorska [Favourite of the Pjatigorsk Estate] and Ljubimec Hutora Pjatigorska $\times$ Belosemjačko 187 [White-seeded 187], bred at Harjkov, had more vigorous root systems than their parental forms. The hybrids are productive and the flavour of their fruits is good.

- 713 MAINS, E. B.
(**Inheritance in *Curcubita Pepo***).
Pap. Mich. Acad. Sci. 1950 : 36 : 27-30.

Genetical analyses carried out on progenies of various squashes, pumpkins and gourds at the Botanical Garden, University of Michigan, have shown that two characters, absence of chlorophyll, resulting in yellow seedlings, and rosetted leaves, are inherited as simple recessives. Hard rind is determined by a single dominant gene. The ratios of dark green and bicoloured fruits, with or without longitudinal striping, indicated that the striped and bicoloured conditions are inherited independently. A single pair of genes appear to determine striping, the latter condition being recessive. The extreme variability of the bicoloured condition on the same plant has, however, prevented a definite conclusion being reached concerning the number of genes involved for this character.

- 714 YAMANE, Y.
(**Studies on interspecific hybrids in
Cucurbita. I. On *C. maxima* $\times$ *C.*
moschata and the reciprocal cross**).
Seiken Jiho/Rep. Kihara Inst. Biol. Res.
1952 : No. 5 : 94-99. [Japanese].

Data are provided on the seed setting capacity of a series of interspecific crosses involving

various varieties of the above species. The number of seeds set was generally low. A cytological study of the F_1 hybrid between variety Wasekurokawa of *C. moschata* and variety White Marrow of *C. maxima* showed that meiosis was fairly regular, the usual metaphase configuration being $19_{II} + 2_I$.

- 715 HAYASE, H.
(Studies on *Cucurbita* crosses. I. Pollen tube growth in interspecific hybrids).
Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : 181-90. [Japanese].

Pollen tube growth and seed setting were studied in interspecific pollination experiments involving *C. maxima*, *C. moschata* and *C. pepo*. Hybrid seed was obtained from crosses between *C. maxima* and *C. moschata*. In crosses involving *C. pepo*, no hybrids were obtained though offspring of the maternal type were sometimes produced. When *C. pepo* was used to pollinate *C. maxima*, the pollen tubes penetrated deeply into the ovaries; in other combinations involving *C. pepo*, pollen tube growth was variously inhibited.

- 716 CRISPIN, S.
Some results with vegetative hybridization of vegetables and flowers.
Bull. Indep. Biol. Labs Palest. 1953 : 9 : No. 3 (61) : Pp. 4.

Interspecific grafting between members of the Solanaceae and Cucurbitaceae families was effected. In all cases, pronounced changes in both the scion and the stock were observed, and in many instances these changes were transmitted by seed to the following generations. For example, the F_1 generation obtained from the seeds of the tomato variety Marmande grafted on to a potato stock is reported to have been much more resistant to *Phytophthora* and to have produced fruit 4.2 times as large as those of the original tomato; in addition the fruits ripened earlier and contained considerably more dry matter.

- 717 HAYASE, H.
(On chromosome numbers, polysomaty and persistent nucleoli in cultivated cucurbits).
Idengaku Zasshi/Jap. J. Genet. 1951 : 26 : 41-51. [Japanese].

In *Cucurbita maxima*, *C. moschata* and *C. pepo*, $2n = 40$. Nucleoli in these species frequently persist till somatic metaphase. The ratio of cellular to nuclear diameter at metaphase was

roughly constant for the three species (6.5-8.0). Polysomatic cells too were observed in all three species.

- 718 HAYASE, H. & YAMASAKI, S.
(Studies on *Cucurbita* crosses. III. On bud pollination in *Cucurbita*).
Idengaku Zasshi/Jap. J. Genet. 1950 : 25 : p. 234. (Abst.). [Japanese].

Notes are given on the percentage germination and rate of germination of pollen on the styles of buds of *C. pepo* varieties, and on the longevity of pollen from *C. pepo*, *C. moschata* and *C. maxima*.

- 719 PRAKASH, R.
Better varieties of snake gourd by intervarietal hybridization.
Allahabad Fmr 1953 : 27 : 28-30.

Intervarietal F_1 hybrids of *Trichosanthes anguina* were superior to their parents in vigour, and number and size of fruits. Production of F_1 hybrids by the growers themselves is recommended.

- 720 BATURIN, B. V.
(New varieties of cucumber at the Birjučil Kut Breeding Station).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 6 : 37-38. [Russian].

New cucumber varieties, which are more productive and are more suitable for pickling than the standards in the Rostov province, are described. Pobeditelj 26 [Victor 26] from Berlizovskii x Schilling is a late large-fruited variety. Hybrid 175 from Pobeditelj 26 x De-Massi is a midseason type with good keeping properties and showing resistance to drought. It yields 2-3 tons more per ha than the standard Rjabčik 357/4 [Partridge 357/4]. Hybrid 86 from Lenkoran x Hybrid 16 has similar properties to Hybrid 175.

- 721 PORTER, D. R. & YOUNKIN, S. G.
Ace, a new tomato variety for California.
Seed World 1953 : 72 : No. 11 : 88-89.

Ace was bred at Davis, Calif., from crosses involving Garden State, Rutgers and Victor. Developed primarily for central California, it is however well adapted as a processing variety for other areas of the United States. Its advantages include uniform ripening, intense red colour, unusually large fruits and relatively low acid content. In several respects Ace is superior to Pearson.

722 QUADT, F.

Untersuchungen über erbliche Nekrosen und ihre Beziehungen zur Resistenz. (**Investigations into inheritable necroses and their relationship to resistance**).

Züchter 1953 : 23 : 223-43.

Inheritable autogenous necrosis in the hybrid progeny of the cross *Solanum lycopersicum* x *S. racemigerum*, effected in an attempt to incorporate the latter's resistance to *Cladosporium* into cultivated varieties, is discussed. It was established that a dominant gene *N* is responsible for the necrosis, a second inhibiting gene *H* counteracting and partially or completely eliminating the necrosis induced by *N*. Resistance to *Cladosporium* appeared to be linked with the tendency to necrosis.

Development of the necrosis is largely dependent upon external environmental factors. Strong light or an increased supply of potash lead to an increase in necrosis, and other factors, such as water supply and temperature, were observed to have an influence. In winter, all plants were healthy; in summer, genotypes *nnHH*, *nnhh* and, depending upon environmental factors, *NNHH* were healthy. *NNhh* genotypes develop necrosis in summer, as do some *NNHH* plants which, however, vary considerably. The implications of the lethal gene *N*, held in check by *H* and thus prevented from destroying the plant, also being responsible for resistance to *Cladosporium* are discussed, it being suggested that the physiological disturbances in the plant brought about by *N* prevent the parasite developing. These physiological disturbances could explain why strains of cultivated plants into which the resistance gene to *Cladosporium* from *S. racemigerum* has been incorporated do not yield as well as plants susceptible to *Cladosporium*.

The results of these independent researches are largely in agreement with the conclusions arrived at by Langford (cf. *PBA*, Vol. XVIII, Absts. 1925 and 2555).

723 DENNETT, R. K.

The inheritance of shape index, locule number, and stem color in derivatives of a hybrid between *Lycopersicon esculentum* by *Lycopersicon peruvianum*.

Abstr. Doct. Diss. Pa St. Coll. 1952 (1953) : 15 : 455-57.

Analyses of fruit shape, locule number and stem colour in the F_1 , F_2 and F_3 and test-cross progenies from the above cross grown at the

Pennsylvania State College have shown that all three characters are controlled by single genes. The allele *Aw*, for purple stems, is dominant over *aw*, for green stems. Interspecific hybrids carrying *aw* are phenotypically indistinguishable from the *a* genotype of *L. esculentum*; *a* and *aw* are not, however, alleles but belong to linkage groups V and I, respectively. Nonovate fruits had many locules, while ovate fruits always had few locules, suggesting that these characters are controlled by two closely linked genes or a single gene affecting both. The symbol *Ol* is proposed for the dominant gene or genes determining nonovate fruits with many locules. *Aw* and *ol* are closely linked, with 1-2% crossing-over, and both are linked to *d*, for dwarf habit, with the same cross-over value as that between *o*, the gene for fruit shape in *L. esculentum*, and *d*. *Ol* is therefore thought to be an allele at the same locus as *o*. The allele *lc*, determining locule number in *L. esculentum*, is situated in linkage group I, about 40 cross-over units from the *ol* locus in the interspecific hybrids.

724 BAZAVLUK, V. JU.

(Graft chimeras are vegetative hybrids with a mixed inheritance).

Trudy Inst. Genetiki (Proc. Inst. Genet.) 1952 : No. 19 : 82-109. [Russian].

Some chimeras between *Solanum nigrum* and tomato and between *S. guineense* and tomato, which are regarded as vegetative hybrids with unstable mixed inheritance, are described. Microscopic analyses of the fruits showed that mutual interaction between the tissues derived from each component had occurred. For instance, in the former hybrid, the cells of *S. nigrum* showed a lower anthocyanin content and thicker and yellower cell walls than the normal type. The seed progenies of these chimeras gave segregates analogous to those of the sexual hybrids.

725 BREŽNEV, D. D.

(The question of the inheritance of acquired characters in tomatoes).

Agrobiologija (Agrobiology) 1953 : No. 3 : 29-40. [Russian].

Heritable changes in many varieties of tomatoes grown for 3-5 generations under varied external conditions included changes in size of fruit, number of loculi, hardness, biochemical properties and the length of growth periods. The effects of external conditions upon the different characters varied and the changes occurred more readily in some varieties than in others.

- 726 ALPATJEV, A. V.
(The productiveness of tomatoes in relation to the methods of seed growing).
Agrobiologija (Agrobiology) 1953 : No. 2 : 48-54. [Russian].

Various agrobiological methods of improving yield, vigour and the quality of fruits and seeds of tomato, including hybridization, are described. Heterotic effects were observed in some inter-line hybrids of Štambovyĭ Alpatjeva 0905 [Alpatjev's Determinate 0905] and intervarietal hybrids of Štambovyĭ Alpatjeva 0905 x Planovyĭ [Plan]. In the latter, heterosis was more noticeable. Crossing between similar varieties such as Earliana Gribovo, Patriot and Krasnoznamennyĭ [Red Flag], and one or twofold selection of the resultant hybrids, are regarded as good methods of improving varieties.

- 727 NAZAROV, S. P.
(A hybridization method by fusing fruits).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 37-40. [Russian].

A new method of grafting, consisting of fusing portions of tomato fruits left on their mother plants, is described. Heritable changes, observed in the first and second seed generations of several vegetative hybrids, included variability in respect of leaf and fruit shape, number of loculi, fruit colour and earliness. Some progenies of the hybrid between Zolotaja Koroleva and Gribovskii Skorospelyĭ [Early Gribovo] were interesting on account of the good keeping properties of their fruits.

- 728 HAN LIOE HONG & VERKERK, K.
Vergelijking van verschillende methoden van kunstmatige bestuiving bij tomaten.
(Comparison of different methods of artificial pollination of tomatoes).
Meded. Dir. Tuinb. 1953 : 16 : 229-38.

The effects were compared of pollination of the tomatoes Ailsa Craig and Tuckqueen by (1) an electric buzzer (cf. *PBA*, Vol. XVI, Abst. 1108); and (2) the methods used in normal practice, viz. (a) in damp weather, shaking the wire supporting the plant, or (b) in dry and warm weather, spraying with water.

The use of the buzzer resulted in a higher yield and mean weight of fruit, more top-grade fruits and an earlier harvest. The use of methods (1) and (2) together gave no higher yield than (1) alone. In the case of Ailsa Craig, the financial return from the use of the buzzer was 20% more than from method (2).

- 729 LEWIS, D.
Some factors affecting flower production in the tomato.
J. Hort. Sci. 1953 : 28 : 207-20.

Research on flower formation in the tomato showed that two separate genetic influences are involved, (1) a major gene and (2) a system of polygenes largely responsible for the difference in number of flowers per inflorescence in cultivated varieties.

- 730 CHEVALIER, A.
L'extension moderne de la culture de la tomate à travers le monde et sa dégénérescence. (The extension in modern times of tomato cultivation throughout the world and its decline).
Rev. Int. Bot. Appl. 1953 : 33 : 267-69.

Commenting on and amplifying MacCue's bibliography on the tomato (cf. *PBA*, Vol. XXIII, Abst. 2259), the writer draws attention to historical records of the occurrence of *Lycopersicon cerasiforme* in South America, Mexico and tropical Africa. The author has observed mutation of the large-fruited, ribbed tomato into the wild *cerasiforme* type in Africa but has never observed the reverse mutation.

- 731 GRIFFING, B.
An analysis of tomato yield components in terms of genotypic and environmental effects.
Res. Bull. Ia Agric. Exp. Sta. No. 397 : 324-80.

Data are presented on variability, with respect to fruit weight, number of fruits, and two components of the latter, number of clusters and number of fruits per cluster, in five inbred lines of *Lycopersicon esculentum* and an inbred of *L. pimpinellifolium* maintained at the Iowa Agricultural Experiment Station, and in all possible F_1 hybrids from these lines. The construction of gene models for each variable showed that many loci were involved, their effects being additive on a logarithmic scale with a constant dominance effect. A significant and positive genotypic correlation was found between number of clusters and number of fruits per cluster; it is assumed that both variables are determined by the same set of genes. Fruit number and fruit size showed a significant negative correlation; competition between these two opposing characters appears to be enforced by the genetic limitation on the capacity for fruit production. The magnitude of the correlation coefficient indicates that fruit number and fruit size are determined by the same gene complex. It appears that the

primary function of the entire gene complex is to control the balance between these two opposing factors contributing to the total yield; correlated responses are, presumably, pleiotropic manifestations of the same complex.

- 732 UNGER, K. & FABIG, F.
Über den Einfluss der Temperatur auf die Erntezeit und Ertragssicherheit bei einigen Tomatensorten. (**On the influence of temperature on the time of harvesting and reliability of yield of some tomato varieties**).
Züchter 1953 : 23 : 257-66.

Optimum temperature requirements were established for four varieties of tomato. Early varieties yield well even in low temperatures, whilst the higher-yielding later varieties are not adversely affected by low temperatures up to the time of flowering.

- 733 CONOVER, R. A. & WALTER, J. M.
The occurrence of a virulent race of *Phytophthora infestans* on late blight resistant tomato stocks.
Phytopathology 1953 : 43 : 344-45.

During 1951-52, late-blight resistant stocks of P-1 and P-3 at Highlands Farm, Homestead, Fla., showed an increasing number of normal sporulating lesions in addition to the abortive lesions characteristic of resistant individuals. Isolates from these sporulating lesions proved more virulent than collections of *Ph. infestans* from Dade County and Bradenton, Fla., in field inoculation experiments, all lines of tomato being equally susceptible to the Highlands Farm isolates, regardless of their differential reaction to isolates from other sources. It is therefore assumed that a virulent race of *Ph. infestans* not present in previous seasons was responsible for the susceptibility of hitherto resistant stocks. The possibility that this race may have originated locally is briefly discussed.

- 734 FELIX, E. L.
Susceptibility to tomato buckeye rot fungus in Tennessee.

Phytopathology 1953:43:p. 290. (Abst.).
Of the *Lycopersicon* spp. tested, only *L. pimpinellifolium* showed resistance to buckeye rot (*Phytophthora parasitica* var. *terrestris*) of the fruits.

- 735 **New Maryland tomato named Chesapeake.**

Seed World 1952 : 72 : No. 11 : p. 91.
Chesapeake, developed from a three-way cross of Brown's Special, Marglobe and Pan America at the Maryland Agricultural Experiment

Station, is resistant to cracking and highly resistant to *Fusarium* wilt.

- 736 CANNON, O. S. & WADDOUPS, V.
Loran Blood and VR Moscow. Two new *Verticillium* wilt resistant tomatoes for Utah.

Fm Home Sci. 1952 : 13 : 74-75.
Loran Blood was developed from a cross between Stone and a *Verticillium* wilt-resistant hybrid line at the Utah Agricultural Experiment Station. It is earlier than Stone and has given 20% higher yields. Except for its wilt resistance, VR Moscow resembles Moscow; it was developed by crossing Moscow with a resistant hybrid line, and twice back-crossing to Moscow. Both of the hybrid parents derived their wilt resistance from a Peruvian cherry tomato.

- 737 DEAN, J. L. & STRUBLE, F. B.
Resistance and susceptibility to root-knot nematodes in tomato and sweet potato.

Phytopathology 1953:43:p. 290. (Abst.).
Roots of *Lycopersicon peruvianum* and its hybrid derivatives, showing resistance to nematode (*Meloidogyne incognita*), were invaded by fewer larvae than those of the susceptible tomato variety Marglobe. In the former, the roots developed extensive necrosis within 48 hours; none of the invading larvae developed as far as the second moult. Susceptible and resistant roots of sweet potato exhibited no differences with respect to number of larvae entering the roots. In the roots of resistant lines necrosis occurred several days after inoculation; although a few nematodes reached egg-laying maturity, most of the larvae died.

- 738 FINLAY, K. W.
Inheritance of spotted wilt resistance in the tomato. II. Five genes controlling spotted wilt resistance in four tomato types.

Aust. J. Biol. Sci. 1953 : 6 : 153-63.
Inheritance of resistance to ten strains of spotted wilt virus was studied in crosses among the resistant types *Lycopersicon pimpinellifolium* (Porter's strain) and the *L. esculentum* varieties Rey de los Tempranos [King of the Earlies], Pearl Harbour and Manzana [Apple], and in crosses of each of these with the susceptible variety Potentate. Resistance to certain strains in the F_1 and F_2 tended to be associated with resistance to other strains, five groups of strains being differentiated by F_2 reactions. The following five genes, consisting of two

dominant genes and three independent recessives are postulated as being responsible for resistance or immunity to the different groups of strains: Sw_1^a , for resistance to strains TB₃, N₁ and R₁; Sw_1^b , for resistance to TB₂; sw_2 , for resistance to TB₁, N₂, R₂ and R₃; sw_3 , for resistance to R₂, R₃ and M₂; and sw_4 , for immunity to M₁ and M₂. *L. pimpinellifolium*, Rey de los Tempanos, Pearl Harbour and Manzana have the genotypes $SW_1^a sw_2 sw_3 sw_4$, $SW_1^b sw_2 sw_3 sw_4$, $SW_1^a sw_4$ and $SW_1^a sw_3$, respectively. The relative value of the four types as parents in breeding for resistance to spotted wilt, combined with desirable agronomic characters, is discussed.

- 739 KRUŽILIN, A. S. & BELIK, V. F.
(**Metabolic processes in distant vegetative hybrids**).
Agrobiologija (Agrobiology) 1953 : No. 3 : 116-23. [Russian].

In Moscow, changes in biochemical properties of vegetative hybrids of tomato with *Capsicum*, *Physalis* or egg plant were normally observed in the F₀ and the first seed generation, but they also occurred in the second or third seed generation, for instance, in respect of dry matter and sugar content. The effects of grafting were intensified when the hybrids were again grafted on the same stocks. Some promising new egg plants, interesting for their productiveness and high content of vitamin C, sugars and dry matter, were obtained.

- 740 PICARD, J.
Recherches sur la féverole. (**Investigations on the field bean**).
Ann. Inst. Nat. Agron., Paris 1953 : 3 : 57-106.

As a preliminary step towards the breeding of *Vicia faba* var. *equina* and *V. faba* var. *minor* for yield, quality, earliness and resistance to diseases, pests, lodging and cold, the populations of the field bean in France and their mode of reproduction have been studied. Though cross pollination averaged 45%, autogamy seems to be the normal method of reproduction in the populations investigated.

Brief descriptions are given of the Dutch, Swedish, French and German varieties in observation plots or in variety trials at Versailles and in the Moselle district.

- 741 NEŽEVOJ, A.
(**A variety developed at a collective farm**).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 9 : p. 46. [Russian].
A new *Phaseolus* variety, Belosemjannaja Frunzenskaja Mestnaja [White-Seeded Local

Frunze], which shows resistance to pests, has been selected in the Dnepropetrovsk province. It yields 18-22 c. per ha. and has indehiscent pods borne high above the ground. The quality of the seed is good.

- 742 Das Verhalten einiger Buschbohnen-sorten zu verschiedenen Beizmitteln. (**The reaction of some dwarf bean varieties to different seed dressings**).
Saatgutwirtschaft, Stuttgart 1953 : 5 : 202-04.

In tests to determine varietal differences in reaction to seed dressings, it was found that the germination of fibrous-podded varieties such as Erfurter Speck [Erfurt Bacon] is less inhibited than that of stringless varieties such as Laux Domina.

- 743 QUANTZ, L.
Über das Verhalten von Buschbohnen-sorten gegenüber den Bohnenmosaikviren 1 und 2. (**On the reaction of dwarf bean varieties to bean mosaic viruses 1 and 2**).
NachrBl. dtsh. PflSchDienst., Berl. 1953 : 5 : 129-32.

Data are given on the relative susceptibility of a large number of dwarf bean varieties to infection with bean viruses 1 and 2. The varieties Furore, Idaho Refugee and Wisconsin Refugee were immune to virus 1. No variety was completely resistant to virus 2.

- 744 HERRMANN
Buschbohnen-sortenversuch Marhof 1951/52. (**Variety trial of dwarf beans, Marhof 1951/52**).
Saatgutwirtschaft, Stuttgart 1953 : 5 : 175-77.

Details are given of the percentage germination, yield per plant, earliness of harvest and proportion of diseased beans of six varieties tested. Paas Lintorfer gave the best yield and St. Andreas proved resistant to dry weather conditions.

- 745 ALLARD, R. W.
A gene in Lima beans pleiotropically affecting male-sterility and seedling abnormality.
Proc. Amer. Soc. Hort. Sci. 1953 : 61 : 467-71.

An allele for male sterility, designated ms_1 , was discovered. It affects seedling morphology, and male-sterile individuals can thus be identified at an early stage. This allele has facilitated making the necessary hybrids in certain breeding programmes and genetic investigations.

- 746 RIVALS, P.
Le Dolique d'Egypte ou Lablab (*Dolichos Lablab* L.). [The dolichos bean of Egypt or lablab (*D. Lablab*)].
Rev. Int. Bot. Appl. 1953 : 33 : 314-16.

The botanical nomenclature and the geographical origin and distribution of *D. lablab* are discussed.

- 747 WEISS, M. G.
Registration of soybean varieties, III.
Agron. J. 1953 : 45 : 326-30.

The following soya bean varieties recently registered in the United States are described: Lincoln (cf. *PBA*, Vol. XV, Abst. 537); Roanoke (cf. *PBA*, Vol. XVII, Abst. 1518); Hawkeye (cf. *PBA*, Vol. XVIII, Abst. 1295); Adams (*PBA*, Vol. XIX, Abst. 1424); Wabash (*PBA*, Vol. XIX, Abst. 2187); Monroe (*PBA*, Vol. XIX, Abst. 2985); and Blackhawk (*PBA*, Vol. XXI, Abst. 2258).

- 748 RAEER, J. G. & WEBER, C. R.
Effectiveness of selection for yield in soybean crosses by bulk and pedigree systems of breeding.
Agron. J. 1953 : 45 : 362-66.

The F_6 generations of lines selected by diverse methods of breeding were compared and differences in yield noted. Pedigree testing and phenotypic selection proved markedly superior to the bulk method of breeding, and it is suggested that a combination of the two former methods would represent a considerable advance in breeding for increased yield.

- 749 JACKSON—South's new soybean.
Sth. Seedsman 1953 : 16 : No. 7 : 20, 77.
Jackson soya bean, bred at the North Carolina Agricultural Experiment Station, with the cooperation of the US Department of Agriculture, has a wide range of adaptability approximating to that of Roanoke, a variety which it resembles in quality, oil content and date of maturity. The new variety has, however, outyielded Roanoke by $2\frac{1}{2}$ bushels per acre, and is much more resistant to lodging. Jackson was selected from a back cross of Volstate x Palmetto to Volstate; it combines the height of Palmetto with the desirable seed properties of Volstate.

- 750 KLYKOV, A. P.
(Selecting soya bean seed which shows slow swelling when soaked as a method of improving the variety).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1953 : No. 4 : 73-74. [Russian].

At the USSR Institute of Soya Bean and Castor Oil Plants, resistance to diseases and other

economic characters were improved in several varieties by selecting seed which did not swell when soaked for 4 hours.

- 751 CLARK soybean—boon to early growers in 'border' states.

Sth. Seedsman 1953 : 16 : No. 7 : p. 73.
The US Department of Agriculture has released a new soya bean, Clark, adapted to much of the region suitable for Wabash and to the southern part of the zone where Lincoln is grown. Like Wabash and Lincoln, Clark is resistant to frog-eye leaf spot; it matures slightly earlier than Wabash. Over two years Clark has averaged 41.9 bushels per acre, with 21.8% oil content; comparable figures for Wabash are 35.3 and 21.3, respectively.

- 752 Soya (*Soja max*). Ensayo de variedades y progenies. [Soya bean (*S. max*). Test of varieties and progenies].
Comun. Turrialba 1952 : No. 25 : Pp. 2 : (Mimeographed).

Several USA varieties and the Sumatran variety Dominicana gave good yields of fodder and grain when tested at the Instituto Interamericano de Ciencias Agrícolas at Turrialba, Costa Rica; though they exceeded *Phaseolus* beans in yield they were inferior to cowpeas in both yield and cooking quality.

- 753 BYKOVEC, A.
(A pea variety, Moscow 572).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 6 : p. 59. [Russian].

A new mid-season variety of peas, Moscow 572, showing resistance to pests and diseases, has been made a standard for the Moscow province. At the Institute of Grain Farming of the Non-black-earth Belt it yielded 3.1 c. per ha. more seed than Capital. The 100 seed weight is 170-190 g.

- 754 STRAND, E.
Sortforsøk med ertre på Vollebekk Forsøksgård 1945-1952. (Pea variety trials at the Vollebekk Experimental Farm 1945-52).

Forskn. Fors. Landbr. 1953 : 4 : 279-92.
Comparative trials of 15 Swedish and Norwegian varieties of yellow, green and grey peas (*Pisum sativum* var. *pachylobum*) were carried out at Vollebekk in Norway.

The most productive yellow varieties were Kloster [Cloister], Torsdag III [Thursday III], Ambrosia II, Torsdag II and the Norwegian land variety Onsrud. Mansholt outyielded the other green varieties and should replace the Ringerike pea. Parvus, the highest yielding grey pea, is suitable for all localities except the

highlands, where the very early Vesta is recommended.

Pedigree tables and a chart are included, showing *inter alia* the origin and botanical relationships of the tested varieties and their breeders' names.

755 HAGEDORN, D. J.

The New Era canning pea.

Bull. Wis. Agric. Exp. Sta. 1953 : No. 504 : Pp. 8.

Particulars are given of a new high yielding variety of canning pea, New Era, a selection from a cross between Wisconsin Perfection and Delwiche Commando. It possesses desirable agronomic characteristics and is resistant to both races of *Fusarium oxysporum* var. *pisi* and to bean mosaic 2.

756 KUZJMIN, P. K.

(*Pisum arvense* plants obtained experimentally from *P. sativum*).

Agrobiologija (Agrobiology) 1953 : No. 2 : 27-29. [Russian].

The pea Capital gave several *P. arvense* plants when grown for two generations in the Saranskii district, Mordva ASSR, under conditions to which the latter species appears to be naturally adapted. The initial material was in a pure state and adequate precautions against possible cross pollination were taken.

757 AIZENŠTAT, J. A.

(The effect of the amount of pollen upon the inheritance of characters).

Uspehi Sovremennoi Biologii (Advances in Modern Biology) 1953 : 35 : 271-90. [Russian].

Some promising intervarietal hybrids of tomatoes and peas, which are still under trial at Leningrad, were obtained by pollinating the maternal plants with a small amount of pollen. They produced smaller fruits with less seed than those from pollination with a large amount of pollen. However, the seed gave some vigorous progenies. Maternal inheritance was more evident in material pollinated with a small amount of pollen. In the tomato hybrids, maternal inheritance was observed in the F_1 , whilst in peas changes in respect of seed characters sometimes occurred in the maternal plant. In the pea, segregation occurred in the F_1 .

758 SPEYER, W.

Beitrag zur Bekämpfung des Erbsenwicklers (*Laspeyresia nigricana* Steph.). [A contribution to the control of the pea moth (*L. nigricana* Steph.)].

NachrBl. dtsh. PflSchDienst., Berl. 1953 : 5 : 141-43.

Data are presented on the comparative

susceptibility of 45 varieties of peas to attack by pea moth. In general, the short varieties were less susceptible than the tall.

759 BHATTACHARJEE, S. K.

Cytogenetics of *Lens esculenta* Moench.

Caryologia 1952-53 : 5 : 159-66.

Meiosis in lentil material grown in West Bengal was found to be unexpectedly irregular. Bridges were frequently observed and aberrant chromosome disjunction resulted in pollen grains with atypical chromosome numbers. About 17% of the pollen was abortive. There are 4 nucleoli.

760 CHAUDHARI, B. B. & PATIL, J. A.

'Creeping', a mutant in *Cajanus cajan* Millsp.

Curr. Sci. 1953 : 22 : p. 153.

A true-breeding mutant with a prostrate habit of growth has been observed at the Agricultural Research Station, Nasik, Bombay. The form arose spontaneously in the F_3 of a cross between two normal varieties. The mutant is likely to be useful as a cover crop, and in soil conservation and strip cropping.

761 GOULD, W. A. *ET AL.*

Evaluation of yellow sweet corn varieties for processing.

Res. Circ. Ohio Agric. Exp. Sta. 1953 : No. 19 : Pp. 32.

Methods used at the Ohio Agricultural Experiment Station in evaluating yield and other field characters, in processing and in judging quality are described in detail. For the latter, subjective grading and determination of pericarp content, percentage of soluble solids, succulometer values and moisture content have been employed. Varieties with high yield, large "cut-off" percentage, and good quality when canned and frozen are regarded as the most desirable. It is pointed out that the sweet corns studied tend to show an inverse relationship between yield per acre and some of the properties required for processing; breeders should therefore aim at combining these characters.

762 MURPHY, B. C. & MOORE, E. L.

Tests compare ten varieties of sweet corn.

Miss. Fm Res. 1952 : 15 : No. 12 : 1, 7.

The results are presented of sweet corn variety trials. Aristogold Bantam Evergreen gave the highest yield, followed by Calumet.

BOOK REVIEWS

FLOOD, W. E. & WEST, M.
Dictionary of scientific and technical words.

Longmans, Green & Co., London, New York and Toronto 1952 : 12s. 6d. : Pp. viii + 397 : figs.

The authors of this new glossary of scientific terms have been actuated by the excellent principle that most scientific concepts can be explained to anyone of average intelligence provided that the expounder takes sufficient pains to devise a lucid explanation. They have explained some 2000 terms, covering most of the pure and applied sciences, and also some industrial activities. In general, the explanations are good, especially of the many concepts that text books surround in a cloud of fog. One wonders, though, if lucidity would have been sacrificed had the authors adopted a literary style savouring less of Basic English and the nursery. The pronunciations given are those of current English with most of the vowels degraded to the neutral "er" sound; the phonetic renderings, however, appear so complex that the reader is liable to assume that science is much easier to understand than to pronounce.

In general the standard of accuracy is high. *Mendelian laws*, however, are not explained well, and some geneticists will blush to find that the "chromosome is made up of a number of genes, like a string of beads." Like other scientific glossaries, there is a tendency to introduce terms more recondite than those in normal scientific usage. Most biologists, for instance, prefer *bloom* to *pruina*, and *fission* to *schizogony*. An instance was also noted, under *coprolite*, where preoccupation with etymology was responsible for an erroneous definition. But it would be ungracious to emphasize the incidental defects of an otherwise carefully-planned and well-illustrated production. The rules adopted by the authors in devising their explanations, which preface the book, could be read with advantage by many of those engaged in scientific tuition, and the whole work should prove a useful reference work for those not specializing in science and also for scientists ranging outside their own speciality.

KENNETH, J. H.
Dictionary of scientific terms.

Oliver & Boyd, Edinburgh and London 1953 : 5th ed. : 32s. : Pp. xvi + 506.

The fourth edition of this well-known glossary appeared in 1949 and was reviewed in *PBA*, Vol. XIX, p. 911. The latest edition differs from its predecessor in an additional 20 or so pages of new terms. The publishers however have kept to their judicious policy of resetting the entire volume so that all the additions appear in correct alphabetic order. The latest edition will prove of special interest to geneticists and plant breeders in that a number of the newly added terms pertain to genetics, cytology or evolutionary theory. One notices however the continued absence of such terms as *topocline*, *idiogram* and *Jordanon*, which are in more frequent use than some of the terms cited. The mode of arrangement of the present edition is identical with that of the previous edition; it can be highly recommended to all biologists.

GOULDEN, C. H.
Methods of statistical analysis.

John Wiley & Sons, Inc., New York and Chapman & Hall, Ltd., London 1952 : 2nd ed. : 60s. : Pp. vi + 467 : figs. : tables.

This book made a good impression when first published in 1939. It covered adequately the known basic statistical methods, with an eye more particularly on the needs of biological and agricultural research workers. It was thoroughly up-to-date and authoritative, without being too diffuse and difficult, on such questions as analysis of variance and covariance and multiple regression analysis.

The subject matter has been very extensively revised in the new edition, but the same degree of care has gone into the compilation as formerly. Enough new material, due to theoretical advances since 1939, has been incorporated to make it virtually a new publication, and a very necessary one for research workers. The main changes are (1) that two chapters on Simple Experiments and the Field Plot Test have been replaced by four chapters on Basic Experimental Designs, Factorial

Experiments, Incomplete Block Experiments and the Treatment of Non-orthogonal Data; and (2) that a final miscellaneous chapter has been replaced by three chapters on the Discriminant Function, Probit Analysis and Quality Control.

J. W.

PEARCE, S. C.

Field experimentation with fruit trees and other perennial plants.

Tech. Commun. Bur. Hort., E. Malling No. 23. Commonwealth Agricultural Bureaux, Farnham Royal, Bucks 1953 : 10s. : or \$1.40 : Pp. x + 131 : figs. : tables.

In 1931 the Imperial Bureau of Fruit Production (now the Commonwealth Bureau of Horticulture and Plantation Crops) published, as one of the first of its technical communications, a bulletin "Field Experiments in Horticulture," by T. N. Hoblyn, then the statistician at East Malling Research Station. Since then many advances have been made in the theory of experimental design, and much additional experience has been gained in its application to horticultural experiments. The present publication is more than twice the size of the old one, and has been written by the present-day chief statistician at East Malling. It is authoritative, and, although largely expository so far as theoretical methods are concerned, will well repay examination by the general reader; on the other hand the horticultural research worker will find it a rich source of information on practical procedures. Nine chapters range through the various types of design, including a section on calibration, to the analysis of results, with final sections on "mishaps and remedies" and the measurement of perennial plants. Four appendices are of a more technical statistical nature on the subject of analysing data, including a general method of "computing the analysis of variance" and a discussion of the analysis of covariance.

J.W.

COCHRAN, W. G.

Sampling techniques.

John Wiley & Sons, Inc., New York and Chapman & Hall, Ltd., London 1953 : 52s. : Pp. xiv + 330 : figs. : tables.

The modern methods of making an exact science of the sampling method, with the aid of the apparatus of mathematical statistics, may be said to have started with the agricultural field experiment. The techniques have since developed to deal with surveys in many fields, and also with census work and applications to industrial processes. There are not yet many

books available on the subject as a whole. Professor Cochran's book may be heartily recommended both to the beginner and the specialist. For the benefit of the former it is written simply and clearly; the latter will find it most comprehensive. A certain amount of mathematics is indispensable but this has been kept down to the minimum, and the methods and rules can be understood by the non-mathematician.

The contents may be briefly described by the chapter headings. Simple random sampling is followed by sampling for proportions and percentages, and by the estimation of sample size. Stratified random sampling follows, and then ratio and regression estimates. A chapter on systematic sampling is followed by one on the type of sampling unit. Subsampling is considered for units of equal and unequal size. Double sampling is then considered, and a final chapter deals with sources of error in surveys. The book is based upon a course of lectures given at North Carolina State College for some years, and these have been available for some time in mimeographed form. The experience gained has been put to good use, and the material of the book is authoritative and well set out, with the needs of the student in mind the whole time.

J. W.

Evolution. Symposia of the Society for Experimental Biology. No. 7.

Cambridge University Press 1953 : 45s. : Pp. xix + 448 : figs. : tables : plates.

This volume, the seventh in the series, contains the papers read at a Symposium of the Society for Experimental Biology held at Oxford in July 1952 in collaboration with the Genetical Society. The foreword is by J. B. S. Haldane, who sums up the importance of the symposium and the significance of the different contributions. Pringle opens the symposium with a discussion on the origin of life, and suggests that the forerunners of living organisms were systems of large volume in stagnant parts of the deep ocean. The extreme depths of the sea, free from radiation and turbulence, and high pressure, are believed to have provided the necessary conditions for the evolution of biological systems. Baldwin stresses the importance of biochemistry in discovering a unity at the molecular level between all living organisms. There is an essential similarity between the tissue fluids of all animals and the putative composition of sea water in early geological time. In giving a chemical analysis of living

forms, Baldwin stresses that the origin of life was essentially a chemical process. Hinshelwood, in his article on adaptation in micro-organisms and its relation to evolution, gives evidence to support the view that adaptive changes in bacteria are not necessarily due to chance mutants, but involve a change in the proportion or structure of the enzymes. The stability or permanence of adaptive changes, for which he postulates an autocatalytic mechanism, depends on the number of generations the bacteria are kept under the particular environment. Demerec, discussing the reaction of genes of *Escherichia coli* to certain mutagens offers evidence to show that both spontaneous and induced mutation rates are determined by the allelic form of the gene present in a certain locus, and that each allele is affected by any specific mutagen in a specific way. There is often an unexpected delayed effect, several divisions occurring before mutants induced by mutagen treatment appear, this suggesting that the effects of the mutagen are indirect, and probably cause some change in the metabolism of the cell. Kendall, in his article on stochastic processes and the growth of bacterial colonies, deals with the mathematical aspect of mutation and selection in bacteria. Mather deals with the genetical structure of populations and discusses the action of natural selection and its consequences. The question is asked whether Darwin's theory of evolution by means of small cumulative mutations is correct, and the possibility of sudden major mutations is discussed. Inbreeding and its effects upon variability, the equilibria of populations as affected by selection, and the evolution of genes are also dealt with.

Thoday, in "Components of Fitness," defines fitness as the ability of a unit of evolution to survive for a given long period of time, and lays down the conditions necessary for a genetic system to be successful. The genetic system and its relation to fitness, phenotypic flexibility, environmental change, and progress in fitness are discussed. Baker, in his article on race formation and reproductive method in flowering plants, uses the genera *Armeria* and *Limonium* to support the theory that obligatory outbreeding plants are generally more variable in a given locality than self-compatible plants. The effect of introgressive hybridization is discussed. Valentine's article upon the evolutionary aspects of species differences in *Primula* deals with hybridization experiments with five groups of the *Vernales* group of *Primula*. Many of the differences in their taxonomic characters

are controlled by a small number of genes, but the viability of the hybrid seeds and the fertility of the hybrid plants seem to depend upon other sets of genes.

Holtum, in "Evolutionary trends in an equatorial climate" discusses the evolution of plants which are continuous both in growth and flowering and the effect of an extremely uniform climate upon the rate of evolution.

Manton, in her article on the cytological evolution of the fern flora of Ceylon, points to the prevalence of polyploidy and concludes that the grade of polyploidy is a more significant indication in a flora of preceding evolutionary activity than is the percentage of polyploid species.

Waddington discusses epigenetics and evolution, and asks whether the selection of random mutants and variations constitutes the whole story of evolution. Recent experimental work on flies which had responded to temperature shocks by developing crossveinless wings (cf. Abst. 40) is described. Environment can have apparently a developmental effect, and it would appear that apparently unadaptive characteristics can be selected because the genes which determine them also affect behaviour.

Spurway, in his article on the genetics of specific and subspecific differences in European newts, describes the crossing of four races, and discusses the vigour and fertility of the hybrids and their progeny.

Hovanitz, in "Polymorphism and Evolution" discusses dominance modification in butterflies and shows colour polymorphism in females of different *Colias* species to be also a polymorphism for behaviour. Dowdeswell and Ford, in an article on the influence of isolation of variability in the butterfly *Maniola jurtina* in England and Wales deal with the question of genetic drift and polymorphism of wing spotting. Sheppard in "Polymorphism and population studies" describes the genetic patterns in isolated colonies of the moth *Panixia dominula*.

Heuts's contribution is on regressive evolution in cave animals, and the selective value of low metabolism under conditions of acute food shortage is discussed. Steven describes the results obtained from crosses between races of *Clethrionomys glareolus* in an article on recent evolution in the genus. Medawar contributes an article on the evolution of viviparity in vertebrates.

Other contributors are Manton on the locomotory habits and the evolution of the larger arthropod groups, Willmer on determining factors in the evolution of the retina in vertebrates,

and Chance and Mead on social behaviour and primate evolution. A postscript by Danielli sums up the physical and chemical aspects of evolution and discusses the evolution of genes.

New and promising varieties recently described in the literature (8th issue).

Commonwealth Agricultural Bureaux, Farnham Royal, Bucks. 1953 : 6s. or \$0.85 : Pp. 52.

The eighth issue in this series, compiled by the Commonwealth Bureau of Plant Breeding and Genetics, Cambridge, contains a list of all the most interesting varieties of crop plants, fruits, nuts, and vegetables that have been described in the technical literature during the last four years. Details are given of the main characteristics of the varieties listed, their name and origin, and sources from which further information and samples of seed may be obtained. The list thus constitutes a complete cross section of the practical results of plant breeding in all parts of the world during recent years and forms a valuable reference book for plant breeders, seedsmen, practical farmers and horticulturalists who wish to keep themselves informed of progress made in plant improvement.

AUDUS, L. J.

Plant growth substances.

Leonard Hill Ltd., London 1953 : 42s.
Pp. xix + 645 : 53 figs.

In this thorough and solidly-written account of plant growth substances, Professor Audus provides a comprehensive review of the biology, chemistry and economic significance of the auxins, various synthetic growth substances, growth inhibitors and the factors postulated to control the development and differentiation of plant organs. The economic applications considered include the stimulation of root formation in cuttings, the promotion of graft unions, parthenocarpic fruit formation, inhibition of sprouting in stored vegetables, selective weed killing, control of fruit drop, and fruit thinning. The only application that seems to receive rather scant treatment is the use of hormones in accelerating the preharvest maturation period.

The author has been at pains to render his text intelligible to the general reader. Such terms as protoplasm are therefore explained in footnotes. It is doubtful, however, whether the general reader will be much at ease in the physiological sections of the book.

In general, the exposition is careful and clear, and the author's balanced treatment of the role of organic matter in the soil will no doubt cheer the compost devotee. Occasionally, as when dealing with pollen compatibility on p. 305, the exposition becomes a little loose and the allusion to the necessity of mating for maintaining the vigour of the species has a faintly mystagogic flavour. But apart from such minor points and a few references that have gone astray, the whole book bears the impress of highly judicious compilation and should prove of value both to biologists, agriculturalists and fruit growers.

STEARN, W. T. (Editor).

International code of nomenclature for cultivated plants.

Royal Horticultural Society, London
1953: 1s.: Pp. 29.

The latest edition of the International Code of Nomenclature for Cultivated Plants was drawn up at the International Botanical Congress in 1950 at Stockholm and revised at the International Horticultural Congress in 1952 at London. It remains provisional till the next international horticultural congress but is official in the meanwhile.

The present edition contains an introduction on the history of horticultural nomenclature by the editor, a useful summary of the rules, and finally the full text.

The most important changes relate to the naming of hybrids, which for long has been the most striking archaism in the official code. The present rules enable backcrosses to be referred back to the original cross, and complex crosses to be named without reference to the component species. Special ways of dealing with varietal assemblages (convarieties), lines, line hybrids, clones, apomicts, chimeras and graft combinations are set out.

No new Latin names for cultivated varieties (cultivars) are to be coined after 1 January 1954, but the Roman alphabet remains the norm. A list of prudent directions how not to name varieties is given.

Priority is still the touchstone when deciding between cultivar synonyms but not so inflexibly as with Latin names, since disused names are to be relegated to the synonymy. Cultivar names should preferably remain unchanged when taken over by some other country, but when this is inconvenient, transliteration or translation is recommended.

While it would be foolish to suppose that the new code will present no difficulties in operation, it is so superior to the earlier rules that it is to be

hoped that its provisions will be adopted as widely as possible by all those responsible for naming horticultural plants.

Annual Review of Microbiology.

Volume 7. Annual Reviews, Inc., California, USA 1953 : \$6 : Pp. x + 505.

The seventh volume of this important series (cf. *PBA*, Vol. XXIII, p. 163) again contains a section on the genetics of microorganisms, contributed this time by O. Wyss and F. L. Haas, reviewing over 200 papers that had appeared on the subject up to December 1952. It is again one of the largest of the contributions, covering 35 pages, indication of the rate at which the subject is developing; the fact that its standard of typographical accuracy falls seriously short of that normally associated with the *Annual Reviews* may or may not be indicative of the same phenomenon. Viral genetics are also treated in the contribution of R. W. Schlesinger on Developmental stages of viruses, and resistance to antibiotics forms one of the topics in the review by F. R. Heilman on Antibiotics. A new section on Medical mycology has been introduced and other reviews of possible interest to plant geneticists are Acid-fast bacteria by H. Block, Nutrition of microorganisms by V. H. Cheldelin and T. E. King, Metabolism of microorganisms by E. R. Stadtman and T. C. Stadtman, Biochemical aspects of viral growth by H. E. Pearson, Biological nitrogen fixation—a reappraisal by P. W. Wilson and R. H. Burris, and Industrial fermentations by F. A. Ledingham.

BISBY, G. R.

An introduction to the taxonomy and nomenclature of fungi.

Commonwealth Mycological Institute, Kew 1953 : 2nd. ed. : 10s. or \$1.40 : Pp. vii + 143.

The first edition of this useful introduction appeared in 1945 and was reviewed in *PBA*, Vol. XVI, pp. 250–51. The present edition differs from the first in that the International Rules of Botanical Nomenclature, given in Part 3 (Part 2 of the first edition), are the new rules approved at the 1950 International Botanical Congress at Stockholm. In addition, a section (Part 2) has been interpolated on the classification and taxonomic literature of the major groups of the fungi. The present volume, like its predecessor, should prove of the greatest value to anyone confronted with taxonomic or nomenclatural problems in the fungi.

IRVINE, F. R.

A text-book of West African agriculture.

Geoffrey Cumberlege, Oxford University Press, London 1953 : 2nd ed. : 14s. : Pp. x + 367 : 32 plates.

The first edition of this textbook, primarily intended for use by African students and as a reference book for elementary school teachers, was published in 1934 and reviewed in *PBA*, Vol. VI, p. 330. Since leaving West Africa the author has attempted to keep in touch with the agricultural progress achieved since the first publication of his book, and he has provided an addendum to the second edition to cover some of the developments since his departure. A new bibliography has been added in which some of the originally included books have been eliminated in favour of more up-to-date ones published since 1934. A short list of useful journals is another addition. The diagrams and 32 pages of photographs remain unchanged.

JUSSIAUX, PH.

Maïs. (Maize).

La Maison Rustique, Paris 1952 : 395 frs. post paid : Pp. 92 : 132 figs.

This well written and attractively produced booklet on maize should disperse most of the mysteries associated in the mind of the layman with the breeding of hybrid maize. Writing principally for the farmer, the author, after discussing the botany of the maize plant, then deals with the technique of hybridization in an essentially practical manner, lists the more important varieties and hybrids and their geographical distribution in France, and deals with methods of selection.

Practical aspects of cultivation, including type of soil required, manuring and maintenance of the crop, together with the combating of the natural parasites to which the plant is prone, are then handled. Concluding chapters deal with harvesting and storage and the uses of maize, both as a grain and a green fodder crop. As will be gathered from a perusal of the above, there is hardly a single practical aspect of the cultivation of maize which is not treated. In addition the book is written in an interesting style and is amply and clearly illustrated.

GRIST, D. H.

Rice.

Longmans, Green & Co., London 1953 : 35s. : Pp. xix + 331 : figs. : tables : plates.

This volume is one of a series on tropical agriculture which is being published with the

active encouragement of the Colonial Advisory Council of Agriculture, Animal Health and Forestry, under the editorship of Sir Harold Tempany, formerly Agricultural Adviser to the Secretary of State for the Colonies. As Sir Harold Tempany emphasizes in his introduction, increased rice production is one of the chief problems of world agriculture. A survey of the various aspects of production of this cereal in Asiatic and other countries is therefore timely, particularly as no book covering similar ground has been published since Copeland's work, *Rice*, in 1924. Mr. Grist has combined the information to be drawn from an extensive study of much of the literature with wide personal experience of rice production, first during the many years of service as Agricultural Economist in the Malayan Department of Agriculture, and more recently as a member of the Mission sent by the Colonial Development Corporation to advise on the possibilities of extending the production of rice in British Guiana. In the first chapter some of the views on the origin of the cultivated species of *Oryza* are quoted, and the history of rice cultivation is outlined. On page 59, a further reference to the origin of cultivated rice is to be found, stating, with the sole authority of Burkill's *A Dictionary of the Economic Products of the Malay Peninsula*, that "the cultivated varieties of paddy are derived from hybrids of *Oryza fatua*, *O. minuta* and other wild species." The origin of cultivated rice is a more controversial subject than Mr. Grist allows. Chapter II deals with climate and soils, Chapter III with water supply and control. Chapter IV describes the botanical characteristics of the rice plant, with the aid of explanatory diagrams and photographs. Chapter V is concerned with a number of varietal aspects, but mainly with a discussion of different methods of classifying commercial varieties. The remaining 12 chapters cover the following subjects: pests; diseases; methods of cultivation; cultivation of dry-land rice; mechanized cultivation; nutritional requirements; fertilizers and manures; storage and milling; nutritional value; production, yields and consumption; and the economic conditions of cultivation. An appendix gives the text of an FAO fact sheet outlining the scope and work of the International Rice Commission, including the breeding projects. In his preface, Mr. Grist writes that, in his opinion, the four main ways of securing better yields of rice are, in descending order of importance, improved drainage and irrigation, more effective control of pests, the addition of humus to the land, with or without fertilizers, and

lastly, the selection and breeding of varieties. Breeders will perhaps feel that their contribution to the solution of the general problem of raising production comes off as a rather bad fourth, in view of the scanty attention given to it in the text, compared with the other key lines of improvement. Rice breeding surely merited a single chapter to itself, showing its achievements and possibilities. A book with so wide a range, however, is almost certain to arouse criticisms of inadequacies and omissions, and the author is to be congratulated upon compiling so incisive an account of a very large subject. A bibliography of approximately 300 references and an index complete the survey, which is illustrated by a generous number of photographs.

BARNES, A. C.

Agriculture of the sugar-cane.

Leonard Hill Ltd., London 1953 : 42s. :

Pp. x + 392 : 60 figs. : tables.

This detailed and factual account of the cultivation and utilization of the sugar cane should prove of considerable value to all interested in the practical aspects and history of sugar production, and meet the need for a standard and comprehensive manual on the subject. As the author points out in his preface, there has been a remarkable expansion in the sugar industry during the last few decades. Despite this, however, no recent book on the general subject of the agriculture of the sugar cane has appeared, and the aim of this work is to discuss the various aspects of the cultivation of this important crop plant as they present themselves to the staff of a well-organized sugar cane plantation.

The opening chapter is devoted to a discussion of the importance of the sugar cane as a source of food, cheap fuel and raw materials and to a short history of its cultivation. Chapter 2 then deals with details of world production and output figures, and environmental factors influencing cultivation are given for all the main cane sugar producing areas, together with data on varieties grown, fertilizers used, government control and research activities.

The author then turns to the botany of the plant and its propagation, and gives a description of the growth of new plants from seed pieces. The different types of soil suited to sugar cane cultivation are listed, and the soil groups of the different sugar producing areas given. Detailed data on plant nutrients, drainage and the effects and control of the more important pests and diseases are also presented.

After a brief review of the difficulties at first encountered in growing sugar cane from seed, the writer proceeds to elaborate the importance of breeding and hybridization in producing new varieties with increased resistance to disease. Different techniques of hybridization, the principal characteristics required in the selection of hybrid canes, and the controls necessary before a variety is finally approved are discussed in detail.

The second half of the book is devoted to the practical aspects of plantation and field planning. After a general historical review of the way in which sugar cane plantations have become increasingly mechanized, the writer discusses transport and labour problems, and then passes to a systematic survey of the work involved in running a plantation. Conditions best suited for growing cane sugar, varietal selection, manuring, weed and pest control and irrigation are entered into in considerable detail.

Several chapters are then devoted to the administrative side of the plantation. Management, supervision, staff and organization problems are discussed and advice given on the keeping of farm and field records, and their interpretation. Methods of computing the value of the farmer's crop in different sugar-producing

areas, and the utilization of by-products and surplus sugar are also suggested.

The concluding chapters are devoted to a discussion of the planter's interest in research, private research organizations and planters' organizations, and to a review of the industry's future. Increased mechanization is necessary if the sugar cane industry is to compete with the sugar beet industry. At the present time the former industry can produce sugar more cheaply, but this margin is decreasing and the plantations have to meet the high cost of transporting their product to markets overseas. The general impression one gains of the situation is, however, an optimistic one. "The planter to-day enjoys advantages which have been developed by the advance of scientific knowledge and its application to the problems of crop production to a truly remarkable extent, together with those derived from local and international industrial and market controls. The effects will become increasingly apparent in the future."

As may be gathered from the above, this work contains a detailed account of almost every aspect of sugar cane cultivation that the planter needs to know. The information is presented in a lucid and coherent manner, and makes interesting reading.

NEW JOURNALS

Annual Report of the South African Sugar Association.

The Experiment Station of the South African Sugar Association has published its first report (cf. Abst. 493), prepared with the object of providing a background for future annual reports of current research. Results of investigations have, until now, been printed only as scattered articles in various scientific journals, in particular the *South African Sugar Journal*.

Archiv für Gartenbau.

This journal is intended primarily for horticulturists and has as its aim the reporting of research and progress made in increasing the quality or yield of garden crops. Six numbers a year will be published.

The first issue includes articles on such practical problems as fuel requirements of greenhouses during the night, investigations into the use of steamed earth in cultivating vegetables and investigations into the causes of premature fall of fruit in blackcurrants.

Further information may be obtained from Prof. Dr. Reinhold, Institut für Gartenbau, Berlin-Grossbeeren.

Journal of the West African Institute for Oil Palm Research.

This new publication is designed to record and publicize the research work carried out by the institute, and will be devoted to the study of questions relating to the oil palm industry. It is hoped to produce at least two numbers a year, appearing at irregular intervals, each number consisting of three or four main articles, together with notes of minor research items and topics of general interest. Technical information will be included from time to time, as well as short reviews of books and articles relating to the industry.

The first issue contains an opening article on the work and organization of the institute, and articles on oil palm diseases in Nigeria, the controlled pollination of the oil palm (cf. Abst. 558), field planting of oil palms, and methods of

germinating oil palm seeds. There are also notes on practical aspects of cultivation and two book reviews.

Further details may be obtained from the Director, West African Institute for Oil Palm Research, Nr. Benin City, Nigeria, or from the Crown Agents for the Colonies, 4, Millbank, London, S.W.1.

Materiae Vegetabiles.

This new quarterly, issued by the International Commission for Raw Plant Materials, is devoted to vegetable raw materials, and is intended to provide a connecting link between theoretical and practical aspects of the subject. Botanists, agriculturalists, chemists, technicians and industrialists from all countries are invited to contribute, the publication being multilingual, with a summary in a second language for each article.

The subjects dealt with in part I include: Karroid and Karoo Veld as a source of nutrition for farm animals, flax cultivation in the La Plata district (cf. Abst. 480), the scientific principles of the utilization of resin, the caesalpinias as tanning materials, the effect of fertilizer on the fibre

development of the yucca plant, the significance of terpene accumulation in plants, the utilization of the fibre content of banana trees, and *Styrax* in Greece.

Netherlands Journal of Agricultural Science.

In order to encourage agriculturists in the Netherlands to write articles in a universally familiar language and thus make the results of their research directly available to those unable to understand Dutch, the Netherlands Society for Agricultural Science, already responsible for the publication of *Landbouwkundig Tijdschrift*, has decided to issue a quarterly journal, comprising papers written in English. It is intended that the articles should be of wide interest; three, concerned with the awns of cereals, design of experimental plots, and correlation between bark thickness and yield of *Cinchona*, are summarized in this number of *PBA* (cf. Absts. 229, 4 and 561).

The annual subscription is 16 Dutch guilders (30/- or \$4.25). All correspondence should be directed to Dr. J. A. Frahm-Leliveld, Postbox 27, Wageningen, Holland.